

NOTE CHANGE OF EDITORIAL ADDRESS JUL 9 1931
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 of Ophthalmology is now 524 Metropolitan building, Saint Louis.

SERIES 3, Vol. 14, No. 7

JULY, 1931

AMERICAN JOURNAL OF OPHTHALMOLOGY

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Subscription twelve dollars yearly. Single number, one dollar twenty-five cents.

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

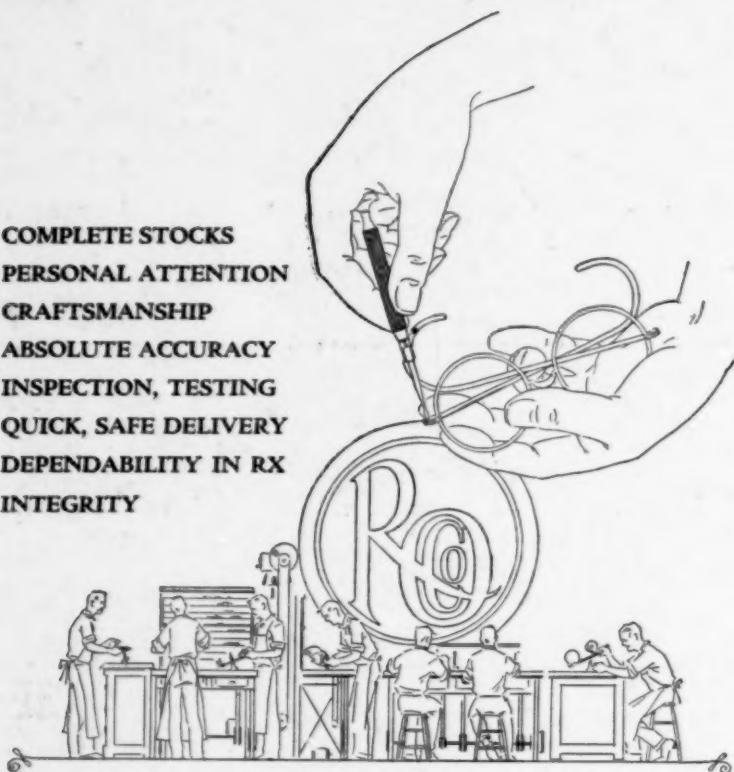
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UVEITIS ASSOCIATED WITH ALOPECIA, POLIOSIS, VITILIGO AND DEAFNESS

Report of two cases

WALTER R. PARKER, M.D., Sc.D., F.A.C.S.
DETROIT

Seventeen cases previously reported in the literature are reviewed and two new cases added. As regards the obscure etiology it has been suggested on the one hand that the uveal tract is first affected, changes in the other pigmented structures being due to anaphylaxis from the disseminated uveal pigment; and on the other hand that all the changes are due to a common source of infection. Read before the Chicago Ophthalmological and the Chicago Otolaryngological Societies at a joint meeting with the American Academy of Ophthalmology and Otolaryngology, October 21, 1930.

Two cases of severe uveitis associated with alopecia, vitiligo (white spots in the skin), poliosis (premature graying of the lashes and brows), and deafness are reported. A review of the symptoms recorded and the results obtained in seventeen cases previously reported is also given in this communication.

Case 1: Male, aged eighteen years, presented himself at the ophthalmologic clinic of the University of Michigan, December 12, 1929. He gave a history of having had for ten days dimness of vision, photophobia, and pain in the eyes. The vision had grown rapidly worse in spite of treatment. The patient feared his partial blindness had been caused by the ingestion of about a pint of home-made liquor to which had been added caustic potash.

Examination: Vision right eye counts fingers three feet, left eye same. Tension normal, pupillary reaction present but sluggish. Ophthalmoscopic examination: right eye: pupil dilates evenly; media clear; disc edematous, swollen about one diopter, rings obscured mesially; retina shows loss of transparency, veins markedly engorged, macula edematous. Left eye: pupil only slightly dilated, posterior synechia below, pupillary remnant skirting pupillary border down and in, and fundus

similar to that of right eye. Visual fields revealed moderate concentric contraction of form field, loss of blue, contraction of red to within the 20 degree circle and green to within the 10 degree circle. Blind spot not enlarged. No scotomata found.

Course: The patient was admitted to the hospital December 13, 1929; atropin was instilled in both eyes three times daily and a general examination was ordered. December 22, 1929. Right eye: iris slightly off color, slight circumcorneal injection, pupil moderately dilated, posterior adhesion at the four and ten o'clock positions. Left eye: moderate circumcorneal injection, iris greatly swollen and off color, pupil only slightly dilated, exudate around the lower pupillary border. No deposits on posterior surface of cornea. Atropin was increased to every two hours, followed by hot compresses; foreign protein was administered intravenously (500 million typhoid bacilli), and divided doses of calomel were given internally. December 23, 1929. Pupil not dilated. Subconjunctival injection of adrenalin chloride was given without effect. December 26, 1929. Foreign protein repeated. Iris swollen and nodular. Keratitis punctata present. Glaucozan instilled without effect on the pupil.

General examination: Urine negative. Blood showed slight secondary anemia (hemoglobin 75 percent, red blood count 4,440,000). Blood Kahn test negative, spinal fluid negative. Basal metabolic rate minus four. Subcutaneous tuberculin test negative. Bacteriological examination of blood negative. Oral examination revealed four teeth with apical pathology; these were extracted, but unfortunately no bacteriological examination was made.



Fig. 1 (Parker). Photograph taken four months after onset of disease.

Otolaryngological examination showed a questionable sphenoiditis and septic tonsils. A tonsillectomy was performed December 20, 1929. Later an exploratory sphenoidectomy was performed which proved negative. Examination of the genito-urinary tract was negative. Repeated examinations by the internist failed to demonstrate any abnormality. X-ray examinations of the chest revealed no evidence of parenchymatous tuberculosis. In the right posterior eighth intercostal space there was a distinct area of increased density situated in the middle lung fold. Four radiograms over a period of seven months were made without demonstrable change in the shadow. The final opinion was that this was a localized

scar from an old inflammatory process. There was no evidence of active syphilis.

In spite of the fact that all possible foci of infection were removed and active treatment instituted, the uveitis progressed. In February there was a marked exacerbation of all symptoms, large punctate deposits developed on the posterior surface of the cornea, the pupillary area became occluded with exudate, and the iris bulged forward. A hypotony developed. On February nineteenth (ten weeks after the onset of the disease) it was first noticed that the proximal ends of the eyelashes were gray. During the next week a patchy alopecia developed on the vertex. Because this type of alopecia is often associated with syphilis of the central nervous system, a provocative course of arsphenamin was given but without change in the serology of the blood or spinal fluid.

By April 29, 1929, the eyes were quiet, the iris was drawn in folds and was vascularized, and the pupillary area was filled with exudative membrane. Vision right eye, counts fingers two feet; left eye, moving objects. The lashes and eyebrows were white and there were several round areas of alopecia. An early vitiligo was present on the face, neck, and shoulders. The patient is still under observation (six months after the onset of disease). No change has been observed in his condition. (See figure 1, reproduced from a photograph taken four months after the onset of the disease.)

Case 2: Female, aged twenty-five years, presented herself at the clinic at the University of Michigan on May 6, 1930, on account of blindness of ten months' duration.

History: In June, 1929, she contracted a severe cold with sore throat, stiffness of the neck, severe headache, and slight pain in the eyes. In two weeks' time the vision had failed so rapidly that she was unable to see to get around. In July (one month after the onset of the disease) she suffered attacks of vertigo, ringing in the ears, and a distinct but not severe deafness, which persisted for about four weeks.

About August first a tonsillectomy was performed. X-ray of the teeth was negative. August twentieth the antrum on each side was punctured, but no evidence of infection was found. She was given mercurial inunction and potassium iodide. The vision had failed slowly but steadily. In September (three months after the onset of the disease) the hair of the head, and the lashes and eyebrows began to fall out. The alopecia was largely confined to the vertex, a fringe of hair being left around the nape of the neck and over the ears. She lost ten to twelve pounds in weight, felt restless, and at times experienced an extreme sense of fatigue. In October she began to feel better. The hair began to grow, coming in almost white. As the original color of her hair was black, the contrast was most striking. During the last two weeks in June (twelve months after the onset of the disease) her friends noticed that her eyebrows were returning to their original color. She had no vitiligo or night blindness. Sixteen months after the onset of the disease the patient was still blind and the brows had recovered their normal color, but the lashes and hair of the head, while partially restored, still showed marked grayness. The vision in the right eye was light perception, left eye the same. Tension right eye 70, left eye 36 mm. (McLean). (See figure 2, reproduced from a photograph taken twelve months after the onset of the disease, showing partial restoration of color of lashes and hair of head and almost complete restoration of the eyebrows.)

Examination: May 6, 1930. Vision both eyes moving objects. Tension right eye 44, left eye 48 mm. (McLean). Iris reflex absent. Right eye, moderate circumcorneal injection, cornea clear, anterior chamber shallow, many deposits on posterior surface of the cornea, pupillary border irregular, many posterior synechiae, exudates in pupillary area, iris vascular and swollen, nodule at base of iris opposite ten o'clock position. Hair, lashes, and brows gray.

Ophthalmoscopic examination: Fundus reflex present. No details.

General examination, including blood and spinal fluid, subcutaneous tuberculin test, urine, bacteriology of the blood, x-ray of chest and teeth, clinical evidence of syphilis, and pelvic disorders all negative. Metabolic rate minus thirteen.

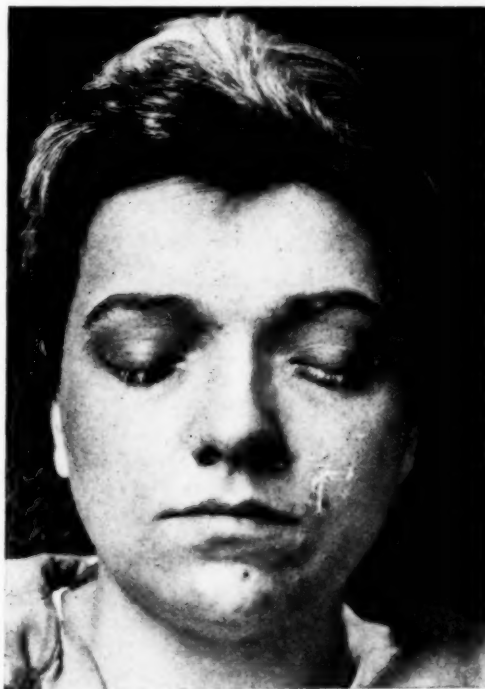


Fig. 2 (Parker). Photograph taken twelve months after onset of disease.

These two cases, apparently identical in character, one observed from the onset and the other late in the course of the disease, represent a type of uveitis which is a part of a syndrome of uveitis, alopecia, poliosis, vitiligo, and deafness. The etiology is unknown and no specific treatment is available. Sixteen cases are recorded by Y. Koyanagi (*Klinische Monatsblätter f. Augenheilkunde* vol. 82, p. 194). Six are reported by Koyanagi himself, four by K. Komoto, and one each by Vogt, J. Komoto, Hata and Herada, Meseda, Tsugi, and Arisoida. Vogt reported the first case in 1906, J. Komoto a case in 1911, and Koyanagi a case in 1914, all but one of the cases in Koyanagi's report coming from Japan. I have found the record of one case not included in

Koyanagi's report. Dr. V. Gilbert in an article entitled, "Vitiligo and eye, contributions to the study of herpetic eye disease" (*Klinische Monatsblätter für Augenheilkunde*, 1910, volume 48, p. 24). The case, in a male of thirty-eight years, was seen first in 1907, when he had uveitis, vitiligo, poliosis, and alopecia. Deafness was not mentioned. The final vision was right eye 6/12, left 6/6. The cause of the uveitis or the neuritis was not determined. The author thought the appearance of the vitiligo was a coincidence. The hair later returned to its normal color. In the following table the incidence of the various symptoms observed is recorded.

TABLE OF RECORDED INCIDENCE OF THE PRINCIPAL CLINICAL MANIFESTATIONS OF UVEITIS WITH ALOPECIA, POLIOSIS, VITILIGO, AND DEAFNESS.

Signs and symptoms	No. of cases recorded	Incidence	Percent
Neuroretinitis	19	4	21.0
Bilateral uveitis	19	19	100.0
Alopecia areata	19	19	100.0
Poliosis	19	17	89.4
Vitiligo	15 (3 not recorded)	10	66.6
Temporary deafness	16 (2 not recorded)	9	55.5
Wassermann positive	13 (5 not recorded)	2	15.4
Hypotony	18	9	50.0
Secondary glaucoma	18	3	16.6
Loss of vision; counts fingers or less	19	19	100.0
Restoration of vision to 5/10 or better	19	6	31.5
Hair regained normal color	18	7	39.0
Detachment of retina	18 (1 bilateral)	2	11.1
Headaches	18	11	61.0
Chills	18	2	11.1
Fever	15 (3 unrecorded)	4	26.6
Vertigo	18	2	11.1

The incidence of neuroretinitis and detachment of the retina may be far from correct, as a satisfactory fundus examination is impossible in many cases.

The uveitis is always bilateral, usual-

ly appearing in both eyes at the same time. The ciliary injection is not marked and as a rule pain in the eyes is not excessive. Fever is rarely present. Alopecia and poliosis are always present and temporary deafness occurs in one half of the cases. The Wassermann reaction was positive in twelve percent of the patients examined. The time of appearance of the alopecia varied from three weeks to three months after the onset of the disease. Seven cases are reported in which the hair regained its normal color in from five to eight months. The white patches in the skin, absent in one of the two cases here reported, appeared in the other case coincident with the poliosis. The final visual results were surprisingly favorable considering the severity of the uveitis and the marked loss of vision at the height of the disease. In all the cases the vision was reduced to counting fingers or light perception, and 27.8 percent recovered a vision of 5/10 or better. Each of the cases here reported is still practically blind. While the pupils are occluded, there is a distinct fundus reflex, the cortical matter apparently not being involved. The appearance has been well described as the "twilight fundus". An iridectomy was attempted in case 2, the one seen late in the course of the disease. The iris was adherent to the anterior capsule and a satisfactory coloboma was not obtained.

The resemblance of this form of uveitis to sympathetic ophthalmia is striking, for alopecia, poliosis, and deafness have been observed in the latter also. No words could better describe the appearance of these eyes than to say that they resemble in every regard a case of double sympathetic ophthalmia. No etiologic factor was determined in the two cases here reported, and the treatment that included foreign proteins, massive doses of the salicylates, anti-specific medication, and tuberculin seemed to have had no beneficial effects. Atropin, adrenalin, and glaucon failed to dilate the pupils.

Etiology: Y. Koyanagi, in his excellent report, reviews the different theories of the possible etiology of the va-

rious manifestations of this disease, emphasizing its resemblance to sympathetic ophthalmia. The ages of the reported cases varied from eighteen to forty-two years, the average being 31.7 years. Due to the presence of alopecia, syphilis was previously considered to be the chief cause of this condition. While two of the thirteen cases examined gave a positive Wassermann reaction, the vast majority showed no signs or symptoms of syphilis; most authors are disinclined to accept syphilis as the cause.

Of the nineteen cases reported, nine suffered temporary impairment of hearing. In each case the loss of hearing came on at the same time or soon after the appearance of the eye symptoms. In the uncomplicated cases the lesion was in the labyrinth or the central nervous system. Vertigo was noted in two cases and an oscillatory nystagmus in but one. In one case here reported the patient gave a history of vertigo and impairment of hearing of about four weeks' duration, but did not come under observation until the hearing was normal and there was no nystagmus present. A complete examination of the ears at the time of the first examination was negative.

Various etiologic theories have been advanced to explain the loss of hearing. It is interesting to note that all the other changes occur in pigmented tissues. May not the pigment in the basilar membrane in the labyrinth undergo similar changes, resulting in partial deafness? Another question suggests itself: Is the uveal tract first affected, causing changes in the other pigmented structures from an anaphylactic toxin formed as an antibody for the disseminated uveal pigment, as suggested by Peters, or are all the changes due to a common source of infection? Koyanagi suggests that, inasmuch as the onset of impairment of hearing in his cases occurred very regularly in the early stages of the disease, the uveal pigment could not have obtained its antigenic properties in the manner suggested by Elschnig. Koyanagi is of the opinion that the loss of hearing has a common etiologic cause with the

other component symptoms of the syndrome.

Most investigators state that a marked loss of the hair of the head occurs, as a rule, two or three months after the appearance of the eye symptoms. In two of Koyanagi's cases the loss was noted in the third week. He calls attention to the fact that if the loss of hair were not anticipated, the earliest appearance of alopecia might be overlooked, which would account for the variable reports in this regard. On the other hand, the bleaching of the brows and lashes is easily noted as an early change, when as a matter of fact it appears after the hair of the head begins to fall out. In general, alopecia may be due to an infection, a reflex neurosis, or an endocrine disturbance. The first two types are characterized by a patchy loss of hair (alopecia areata), and the last type shows a complete baldness (alopecia totalis). As all the cases reported showed alopecia areata, it is possible that they belong to the type due to infection.

Vitiligo occurred in sixty-six percent of the reported cases. It was noted simultaneously with or immediately after the uveitis and appeared on various parts of the body, usually the head, shoulders, nape of neck, and lids. The etiology of vitiligo is unknown, but this frequent association with uveitis seems more than a coincidence.

While graying of the lashes and deafness have been rarely reported in cases of sympathetic ophthalmia, even less frequently does one see alopecia, poliosis, or vitiligo in cases of uveitis. Koyanagi, after an admirable review of the work that has been done, believes he is not far wrong when he concludes that in this form of uveitis the hair and skin complication, undoubtedly also the deafness, are produced, along with the uveitis, by a common and as yet unknown cause.

(I am indebted to Dr. A. M. Culler, formerly a member of the ophthalmic staff of the University of Michigan, now of Dayton, Ohio, for valuable assistance in the preparation of this paper.)

David Whitney building.

THE CHEMICAL CONSTITUENTS OF THE AQUEOUS, VITREOUS AND LENS

A comparative study on animal eyes

C. S. O'BRIEN, M.D., F.A.C.S., AND P. W. SALIT, Ph.D.

IOWA CITY

A comparative study of the biochemical constituents of the aqueous, vitreous, and lens of animals was undertaken as a preliminary to the study of these constituents in the human eye, in order (1) to determine the minimum amount of each substance with which the reliable determination could be made, (2) to develop a technique of micromethods which could be relied upon when used with human eyes, and (3) to ascertain the relative concentration of certain constituents of the aqueous, vitreous, and lens. From the departments of ophthalmology and biochemistry, State University of Iowa.

A comparative study of the biochemical constituents of the aqueous, vitreous, and lens was undertaken in animals as a preliminary to the study of the same in the human eye. Many reports of chemical determinations on the aqueous were found in the literature, while there were only a few reports on the vitreous. No reports were found of comparative studies on the aqueous and vitreous of the same animal. The experiments recorded below were undertaken for the following purposes:

First. To determine the minimum amount of each of the substances with which reliable determinations could be made.

Second. To develop a technique in micromethods which could be relied upon when used with human eyes.

Third. To ascertain the relative concentration of certain constituents of the aqueous, vitreous, and lens.

Most of the micromethods were too coarse for use with such small quantities as one could collect from a single anterior chamber. The determination of sugar concentration most nearly approached the ideal, since reliable results were obtainable when using only 0.2 c.c. of fluid.

Material: The aqueous, vitreous, and lenses from healthy cattle of from one to two years of age were obtained within ten minutes after death (except as noted below). The aqueous was run into a test tube through a corneal opening, after which the vitreous was expressed into another container through a posterior scleral opening. The lens

was then removed and transferred to a weighing bottle, the inside of which had previously been moistened with toluene; a stopper was then carefully inserted to prevent evaporation.

Preparation of material: Aqueous: No preparation was necessary aside from the addition of toluene as a preservative, except in the aqueous used for nonprotein nitrogen determinations. The latter were carried out on a Folin-Wu¹ filtrate of the aqueous, i.e., an aqueous from which the proteins had been removed by precipitation.

Vitreous: A new method of liquefaction was used. Heretofore the vitreous had been filtered and the filtrate examined, but in this laboratory the vitreous was shaken with glass beads and filtration was unnecessary.

Lens: The lenses were weighed, rubbed up in a mortar, water added to 50 c.c., and toluene dropped in as a preservative.

Methods.—Nitrogenous constituents: All determinations were carried out by the micro-Kjeldahl² method.

Sugar: The new Benedict³ method was used.

Chlorides (as NaCl): A micromodification of the Harvey⁴ method for urine chlorides was employed in working with the aqueous. Van Slyke's⁵ "nitric acid-silver nitrate" method was used in determinations on the vitreous and lenses.

Calcium: This was estimated by a modified Kramer-Tisdall⁶ process.

Urea: All urea determinations were carried out by the urease-aeration process², then a colorimetric compari-

son of the nesslerized solution with a similarly treated standard ammonium sulphate solution was made.

Creatinine: For this determination the Folin⁷ picric acid method was employed.

Elapsed time before determinations were carried out: By trial experiments it was found that specimens preserved with toluene and kept in the ice box showed no change in the sugar, chloride, calcium, or urea content; consequently those determinations were carried out at intervals following collection. Other trial experiments disclosed the fact that, unless the aqueous, vitreous, and lens were removed from the eye immediately following the death of the animal, there was a considerable increase in the nitrogenous constituents. All nitrogen estimations were made on the day of collection, except as noted below. Creatinine content decreased slowly as the specimens aged; consequently all the values reported are those from determinations made on the day of collection.

Content of a single eye: On an average the eye of an ox yielded about 1.66 c.c. of aqueous and approximately 15 c.c. of vitreous. The average weight of the lens was 1.9 gm.

Total solids in the vitreous: In a summary of the results of some of the older writers, Hammarsten states that the total solids in the vitreous averaged 1.3 percent; however he quotes Gruenhagen as stating that they were found in a concentration of from 0.9 to 1.1 percent.

In our series of experiments the total solids in the vitreous after a period of drying at 95°C. for twelve to twenty-four hours were found to average 1.16 percent.

Total nitrogen

Kochmann and Roemer⁸, using the micro-Kjeldahl method, found that the total nitrogen of the aqueous of rabbit eyes averaged 51.53 mg. per 100 gm.

We found by a series of trial experiments on standard solutions of ammonium sulphate that an approximate minimum of 0.250 mg. of nitrogen had

to be present in the test solution to insure accuracy. By trial experiments on the aqueous and vitreous it was found that a minimum of 1 c.c. could be used since the average amount of total nitrogen contained in 1 c.c. of each was in the neighborhood of 0.25 mg.

Total nitrogen of the fresh aqueous as shown by two experiments was as follows: first experiment, 24.0 mg. per 100 c.c.; second experiment, 25.8 mg. per 100 c.c.; average 24.9 mg. per 100 c.c.

Total nitrogen of the "stale" aqueous, i.e., the aqueous which was not removed from the eye until eight hours after the death of the animal (the eyes having been removed immediately after death and placed on ice), was as follows: first experiment, 40 mg. per 100 c.c.; second experiment, 41 mg. per 100 c.c.; average 40.5 mg. per 100 c.c.

The above results show that if the aqueous was not drawn from an eye immediately after death there was a considerable increase in nitrogen.

Total nitrogen of the fresh vitreous was shown to be slightly less than that of the aqueous. The results were: first experiment, 22.4 mg. per 100 c.c.; second experiment, 22.4 mg. per 100 c.c.; average 22.4 mg. per 100 c.c.

Total nitrogen of stale vitreous (see stale aqueous), which had been filtered through filter paper, was as follows: first experiment, 134.0 mg. per 100 c.c.; second experiment, 127.7 mg. per 100 c.c.; average 131.3 mg. per 100 c.c.

The determination of the total nitrogen of vitreous preserved with thymol which had been kept at varying temperatures for one week (the same collection as that used in the above two experiments) gave these results: first experiment, vitreous filtered through filter paper had 237 mg. per 100 c.c.; second experiment, vitreous pressed through cheese cloth had 234 mg. per 100 c.c.

This vitreous had liquefied and more came through the filter paper than in the case of fresh vitreous. Since the nitrogenous constituents could not have increased spontaneously it seemed that the results of the last two experi-

ments showed that the filtrate from fresh vitreous did not contain all of the nitrogen. After the same vitreous had aged one week it had almost become liquefied and the total nitrogen in the filtrate was much increased.

Nonprotein nitrogen

The fresh aqueous showed the following nonprotein nitrogen values: first experiment, 21.0 mg. per 100 c.c.; second experiment, 21.2 mg. per 100 c.c.; average 21.1 mg. per 100 c.c.

The nonprotein nitrogen of the fresh vitreous was: first experiment, 15.0 mg. per 100 c.c.; second, 15.4 mg. per 100 c.c.; average 15.2 mg. per 100 c.c.

The nonprotein nitrogen values of stale vitreous (see above), filtered through filter paper, were: first experiment, 33.6 mg. per 100 c.c.; second experiment, 32.2 mg. per 100 c.c.; average 32.9 mg. per 100 c.c.

It is seen from the above data that the nonprotein nitrogen of the vitreous also showed a considerable increase in those eyes from which the vitreous had not been expressed for several hours after the death of the animal.

Protein

There is some question as to the presence of protein in the aqueous. Rados⁹ could not find any protein in human eyes, even in reformed aqueous; Duke-Elder¹⁰ found it to average 0.024 percent in the eyes of horses and 0.04 percent in rabbits. The latter author also found an increased protein content of the reformed fluid. Troncoso states that he found the protein of the aqueous increased in patients with glaucoma.

By calculation (total nitrogen minus nonprotein nitrogen multiplied by the factor 6.25) we found the following values for protein:

Aqueous (fresh), 23.75 mg. per 100 c.c.

Vitreous (fresh), 45.0 mg. per 100 c.c.

Vitreous (remained in eye eight hours, removed and filtered), 615 mg. per 100 c.c.

Vitreous (same as above but one week older and not filtered), 1,266 mg. per 100 c.c.

Chlorides

Bottazzi¹¹ examined the aqueous of ox eyes and determined the sodium chloride content to be 6.89 gm. per 1,000 c.c., while Magitot-Mestrezat¹² found the amount in horses to be 7.11 gm. per 1,000 c.c. Ascher¹³ made a thorough study of the aqueous of diseased human eyes and, during the course of his work, discovered that the sodium chloride content was not always the same in the two eyes of a single individual. Duke-Elder¹⁰ found that the average sodium chloride content of the aqueous in horses averaged 712.4 mg. per 100 c.c. Cohen, Killian, and Metzger¹⁴ found the chloride content of the vitreous to be 678.0 mg. per 100 c.c.

By trial experiments in which known standard solutions of sodium chloride were tested by a micromodification of the Harvey⁴ method, we found that accurate results could be had with 0.2 c.c. of a solution containing 1.4 mg. of sodium chloride.

Aqueous: Using 0.3 to 0.4 c.c. of fresh undiluted aqueous, determinations were made by both the Harvey⁴ and the Van Slyke⁵ methods. The following results were obtained:

<i>First collection</i>		
Experiment		NaCl in mg. per 100 c.c.
1		705
2		725
3		725
4		715
<i>Second collection</i>		
Experiment		NaCl in mg. per 100 c.c.
1		713
2		720
3		727
<i>Third collection</i>		
Experiment		NaCl in mg. per 100 c.c.
1		707
2		707
3		717
<i>Fourth collection</i>		
Experiment		NaCl in mg. per 100 c.c.
1		710
2		710
3		710

Fifth collection			
Experiment	NaCl in mg. per 100 c.c.		
1	687	11	348
2	687	12	361
3	680	13	373
		14	386
		15	336
		Average 356 mg. per 100 c.c.	

The average chloride content of fresh undiluted aqueous was found to be 709 mg. per 100 c.c.

Vitreous: Using 1 c.c. of a 1 to 5 dilution of fresh vitreous in distilled water determinations were carried out by the Van Slyke method.

First collection		
Experiment	NaCl in mg. per 100 c.c.	
1	687	
2	687	

Second collection		
Experiment	NaCl in mg. per 100 c.c.	
1	675	
2	686	
3	686	

Third collection		
Experiment	NaCl in mg. per 100 c.c.	
1	703	
2	698	
3	698	
4	698	

Fourth collection		
Experiment	NaCl in mg. per 100 c.c.	
1	679	
2	691	

The average chloride content of fresh vitreous was found to be 681.6 mg. per 100 c.c.

Lens: For determinations of chloride content in the first collection of lenses an emulsion was made, the ratio of which was 0.45 gm. of lens to 5 c.c. of distilled water. For the second collection the ratio was 1.055 gm. to 5 c.c. of water.

First collection		
Experiment	NaCl in mg. per 100 gm.	
1	320	
2	331	
3	331	
4	286	
5	336	
6	331	
7	331	
8	331	
9	314	
10	333	

Second collection		
Experiment	NaCl in mg. per 100 gm.	
1	204	
2	185	
3	173	
4	185	

We were unable to account for the great difference in the average of the two collections.

Sugar

It has been known for a long time that the eye contains glucose; Pautz¹⁵ found it in the vitreous of oxen. Ask compared the sugar concentrations in the aqueous and whole blood, finding it slightly greater in the former; Duke-Elder¹⁰ made a similar comparison between aqueous and blood plasma and found a higher glucose concentration in the latter. Yudkin, Krause, Goldstein and Berman¹⁶ found in dogs that the sugar concentration of the aqueous varied between 77 and 137 mg. per 100 c.c. Cohen, Killian, and Metzger¹⁴ found that the vitreous of oxen contained an average of 39.0 mg. of glucose per 100 c.c.

Our determinations of the glucose content were made by Benedict's³ new method for blood sugar.

Aqueous: For each experiment 0.2 c.c. of undiluted fresh aqueous was used.

First collection		
Experiment	Glucose in mg. per 100 c.c.	
1	82.4	
2	84.7	
3	100.0	
4	98.6	
5	98.6	
6	90.0	
7	80.0	
8	84.2	

Second collection		
Experiment	Glucose in mg. per 100 c.c.	
1	85.7	
2	85.7	
3	81.1	
4	75.0	

The average sugar content of undiluted fresh aqueous was 89.8 mg. per 100 c.c. for the first collection and 81.9 mg. for the second collection. We were unable to account for the difference. The average sugar content of all specimens was 87.1 mg. per 100 c.c.

For another set of experiments a 1 to 10 dilution of fresh aqueous was used. Each determination was made using 2 c.c. of the dilution, i.e., the actual amount of aqueous was 0.2 c.c.

<i>First collection</i>	
Experiment	Glucose in mg. per 100 c.c.
1	83.7
2	82.1

<i>Second collection</i>	
Experiment	Glucose in mg. per 100 c.c.
1	76.9
2	77.4
3	71.4
4	75.4
5	67.4
6	71.4
7	70.6
8	79.4

The average for the first collection was 82.9 mg. per 100 c.c. and that for the second 73.7 mg. Here again the reason for the difference was unknown.

A third set of experiments was carried out on a 1 to 10 Folin-Wu filtrate of the aqueous and in each determination 2 c.c. was used, i.e., 0.2 c.c. of aqueous.

<i>First collection</i>	
Experiment	Glucose in mg. per 100 c.c.
1	83
2	83
3	77
4	75

<i>Second collection</i>	
Experiment	Glucose in mg. per 100 c.c.
1	93.1
2	94.2

The average for the first collection was 79.5 mg. per 100 c.c. and for the second collection 93.6 mg.

After studying the results of the different methods it was decided that the most accurate and representative results were the ones obtained when we used the undiluted aqueous.

Vitreous: The determinations on the first collection were made with a 1 to 10 Folin-Wu filtrate, but in all other collections a 1 to 5 filtrate was used. Either 2 or 3 c.c. of the filtrate was used in each experiment.

<i>First collection</i>	
Experiment	Glucose in mg. per 100 c.c.
1	61.6
2	62.0
3	61.6
4	59.4
5	51.1
6	49.0
7	46.2
8	50.7

<i>Second collection</i>	
Experiment	Glucose in mg. per 100 c.c.
1	51.0
2	52.8
3	53.6
4	59.5
5	59.9
6	64.1
7	64.4

<i>Third collection</i>	
Experiment	Glucose in mg. per 100 c.c.
1	51.0
2	52.0

<i>Fourth collection</i>	
Experiment	Glucose in mg. per 100 c.c.
1	56.8
2	52.8
3	51.3

The average amount of sugar in the first collection of vitreous was 55.2 mg. per 100 c.c., in the second collection 57.9 mg., in the third 51.5 mg., in the fourth, 57.9 mg., and in the fifth, 53.6 mg. Accordingly there was found an average of 55.5 mg. of sugar per 100 c.c. of vitreous.

(Note: Twelve experiments were done on the aqueous and vitreous of six-week-old calves; the sugar concentration of the aqueous was found to be 108 mg. per 100 c.c., while the vitreous had 56.6 mg. per 100 c.c.)

Lens: From the first collection of lenses a Folin-Wu filtrate was prepared, the ratio of which was 1.2069 gm. of lens material to 15 c.c. of the filtrate. A similar filtrate was prepared from the

second collection whose ratio was 1.264 gm. of lens material to 16 c.c. of filtrate.

the first collection 2 c.c. of vitreous was used; 4 c.c. was used in the others.

<i>First collection</i>	
Experiment	Glucose in mg. per 100 gm.
1	127.6
2	125.9
3	140.0
4	143.3

<i>Second collection</i>	
Experiment	Glucose in mg. per 100 gm.
1	141.8
2	127.5
3	137.6

The average amount of glucose in the lens was found to be 134.7 mg. per 100 gm. of lens.*

Calcium

In the aqueous of horses, Duke-Elder¹⁰ found calcium was present in an average concentration of 6.2 mg. per 100 c.c. Cohen, Killian, and Metzger¹⁴, experimenting on ox eyes, found the vitreous contained an average of 7.9 mg. of calcium per 100 c.c. In our experiments the calcium was determined by a modified Kramer-Tisdall⁶ method.

Aqueous: Undiluted aqueous was used and it was found that relatively large quantities were necessary for each experiment. Each determination on the first collection was done with 2 c.c. of aqueous, and those on the second and third collections with 4 c.c. of aqueous.

<i>First collection</i>	
Experiment	Ca in mg. per 100 c.c.
1	5.17
2	5.82

<i>Second collection</i>	
Experiment	Ca in mg. per 100 c.c.
1	4.45

<i>Third collection</i>	
Experiment	Ca in mg. per 100 c.c.
1	5.20
2	5.20

The average calcium content of the aqueous was found to be 5.17 mg. per 100 c.c.

Vitreous: In each determination on

*Note: Calves' (six weeks old) lenses were found to average 144.8 mg. of sugar per 100 gm. of lens.

<i>First collection</i>	
Experiment	Ca in mg. per 100 c.c.
1	8.20
2	8.45
3	8.28

<i>Second collection</i>	
Experiment	Ca in mg. per 100 c.c.
1	6.46
2	6.46
3	5.59

<i>Third collection</i>	
Experiment	Ca in mg. per 100 c.c.
1	6.96
2	6.96
3	7.20

<i>Fourth collection</i>	
Experiment	Ca in mg. per 100 c.c.
1	7.70

<i>Fifth collection</i>	
Experiment	Ca in mg. per 100 c.c.
1	8.41
2	7.67

The average calcium content of the vitreous was found to be 7.20 mg. per 100 c.c.

Urea

Yudkin, Krause, Goldstein, and Berman¹⁶ found the urea content of the aqueous in dogs to be 25.6 mg. per 100 c.c.; Duke-Elder¹⁰, working on horses, found it to be 21.1 mg. per 100 c.c. of aqueous.

We determined the urea by a urease-aeration-nesslerization technique.

Aqueous: Rather large quantities of aqueous had to be used; 2 c.c. was used in determinations done on the first collection and 4 c.c. in those on the second collection.

<i>First collection</i>	
Experiment	Urea in mg. per 100 c.c.
1	13.70
2	15.34

<i>Second collection</i>	
Experiment	Urea in mg. per 100 c.c.
1	20.05
2	17.76

Urea in the aqueous was found in an average concentration of 16.71 mg. per 100 c.c.

Vitreous: In each experiment 4 c.c. of vitreous was used.

Experiment	First collection	Urea in mg. per 100 c.c.
1		13.70
2		14.93
3		13.05
4		14.08
5		14.55

Experiment	Second collection	Urea in mg. per 100 c.c.
1		12.11
2		13.05
3		13.18
4		16.24
5		16.24
6		15.40

The average concentration of urea in the vitreous was found to be 14.23 mg. per 100 c.c.

Lens: Using 5 c.c. of the 8.269 gm. to 50 c.c. lens emulsion in the first collection and 5 c.c. of the 10.055 gm. to 50 c.c. lens emulsion in the second, the following results were obtained:

Experiment	First collection	Urea in mg. per 100 gm.
1		20.11
2		20.75

Experiment	Second collection	Urea in mg. per 100 gm.
1		20.97
2		21.4

The urea in the lens was found to average 20.80 mg. per 100 gm. of lens.

Creatinine

In the aqueous of horses Duke-Elder¹⁰ found creatinine to be present in a concentration of 2.0 mg. per 100 c.c., while Yudkin, Krause, Goldstein, and Berman¹⁶ found that dog's aqueous contained 1.3 mg. per 100 c.c. Cohen, Killian, and Metzger¹⁴ found that the vitreous of oxen contained 1.1 mg. per 100 c.c.

We determined the creatinine by the Folin⁷ picric acid method and found that the minimum amount of fluid

which could be employed was 2 c.c. Aqueous:

First collection
1.15 mg. of creatinine per 100 c.c.

Second collection
1.33 mg. of creatinine per 100 c.c.

Third collection
1.08 mg. of creatinine per 100 c.c.

The average amount of creatinine in the aqueous was found to be 1.19 mg. per 100 c.c.

Vitreous:

Experiment	First collection	Creatinine in mg. per 100 c.c.
1		1.05
2		1.12

Experiment	Second collection	Creatinine in mg. per 100 c.c.
1		1.01

Third collection
1.01 mg. per 100 c.c.

Fourth collection
1.16 mg. per 100 c.c.

Experiment	Fifth collection	Creatinine in mg. per 100 c.c.
1		1.22
2		1.22
3		1.00
4		1.00
5		1.10

Experiment	Sixth collection	Creatinine in mg. per 100 c.c.
1		1.20
2		1.16
3		1.07
4		1.02
5		1.26

The average amount of creatinine in the vitreous was found to be 1.10 mg. per 100 c.c.

Summary

(1) On an average the eye of an ox contains 1.66 c.c. of aqueous and 15 c.c. of vitreous. The lens weighs about 1.9 gm.

(2) The total solids of the vitreous amount to about 1.16 percent.

(3) The nitrogenous constituents were found as follows:

- (a) Total nitrogen: Fresh aqueous, 24.9 mg. per 100 c.c.; stale aqueous, 40.5 mg. per 100 c.c.; fresh vitreous, 22.4 mg. per 100 c.c.; stale vitreous kept in enucleated eyes for about eight hours on ice and filtered through filter paper, 131.3 mg. per 100 c.c.; stale vitreous, kept in enucleated eyes for eight hours, then preserved with thymol for about one week and filtered before analysis, 236 mg. per 100 c.c.
- (b) Non-protein nitrogen: Fresh aqueous, 21.1 mg. per 100 c.c.; fresh vitreous, 15.2 mg. per 100 c.c.; stale vitreous, kept in enucleated eyes for eight hours, then filtered, 32.9 mg. per 100 c.c.
- (c) Protein: Aqueous (fresh), 23.75 mg. per 100 c.c.; vitreous (fresh), 45.0 mg. per 100 c.c.; vitreous, kept in enucleated eyes for eight hours and filtered before analysis, 615 mg. per 100 c.c.; vitreous, as above, but preserved with thymol for one week after removal and not filtered, 1,266 mg. per 100 c.c.
- (4) Chlorides: Aqueous, 709 mg. per 100 cc.; vitreous, 681.6 mg. per 100 c.c.; lens, 187 to 340 mg. per 100 gm.
- (5) Sugar: Aqueous, 87.1 mg. per 100 c.c. in adult cattle, 108 mg. per 100 c.c. in six week old calves; vitreous, 55.5 mg. per 100 c.c. in adult cattle, 56.6 mg. per 100 c.c. in six-week-old calves; lens, 134.7 mg. per 100 gm. in adult cattle, 144.8 mg. per 100 gm. in six-week-old calves.
- (6) Calcium: Aqueous, 5.17 mg. per 100 c.c.; vitreous, 7.20 mg. per 100 c.c.
- (7) Urea: Aqueous, 16.71 mg. per 100 c.c.; vitreous, 14.23 mg. per 100 c.c.; lens, 20.8 mg. per 100 c.c.
- (8) Creatinine: Aqueous, 1.19 mg. per 100 c.c.; vitreous, 1.1 mg. per 100 c.c.

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THE SEDIMENTATION VELOCITY OF BLOOD CELLS IN EYE DISEASES CAUSED BY VITAMIN A DEFICIENCY

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The blood sedimentation test was made in twenty-two patients with vitamin A deficiency diseases, seven of whom were suffering from keratomalacia, fifteen from xerosis, and one from hemeralopia. Avitaminosis A does not seem to influence blood sedimentation to any considerable degree. Six of the keratomalacia patients and eight of the fifteen cases of xerosis showed normal sedimentation figures. The increased sedimentation figures in the other seven cases of xerosis were attributed to other diseases. From the department of ophthalmology of the Peiping Union Medical College, Peiping, China.

The observations reported in this paper have been made in order to contribute to the investigations on the general changes occurring in the human body caused by vitamin A deficiency. Since the changes in the eyes are not only the beginning signs but also the most remarkable symptoms of vitamin A deficiency, it follows that the greatest opportunity of seeing patients with avitaminosis A is found in the eye clinic of a hospital. The various changes in the eyes, moreover, serve as the best indicator of the degree of severity of diseases involving the general constitution which are attributed to lack of vitamin A. That xerosis and keratomalacia are found relatively often in North China, especially among soldiers, has been reported by Pillat¹.

The method used for the blood sedimentation test is that of Westergren², which may be briefly described here. Into a 2 c.c. syringe was drawn 0.2 c.c. of a 3.7 percent solution of sodium citrate; the syringe was then filled completely with blood taken from the cubital vein after a short compression of the vein. The syringe was immediately emptied into a storing tube, where the contents were mixed by turning the tightly corked tube up and down. Immediately after this the sedimentation test was performed in a pipette, 30 cm. long, with a diameter of 2.5 mm. The height of the plasma layer was noted in numerical value after one hour and two hour sedimentation periods.

Twenty-three adults, ranging in age from eighteen to forty-two years, were available for this test; only one was a female. Seven patients had keratomalacia with perforated cornea in one or

both eyes. Twelve others showed a lower degree of vitamin A deficiency in the body, as evidenced by the less severe changes noted in the eye: that is, xerosis and prexerosis of the cornea, xerosis of the conjunctiva, and wrinkling and pigmentation of the conjunctiva. Two patients showed signs of the earliest stage of vitamin A deficiency, one having hemeralopia, and one Bitot's spots, but no other visible changes in the cornea and conjunctiva.

All the patients without keratomalacia were out-patients. The blood test was done between three and five o'clock in the afternoon, that is, after meals, in a stage of digestion. The seven patients with keratomalacia were in-patients, so that it was possible in these cases to make the blood sedimentation test on an empty stomach in the morning. This is mentioned because several authors have found a slight increase of velocity in blood sedimentation after meals. All the patients in this series had a negative reaction to the Wassermann test. Other special examinations could be done only on the

Table 1

CASES WITH KERATOMALACIA. ALL PATIENTS MALE. BLOOD WAS TAKEN IN THE MORNING BEFORE BREAKFAST

Case	Blood sedimentation	
	After 1 hour	After 2 hours
1	4	13
2	4	10
3	5	8
4	5	15
5	6	11
6	7	20
7	12	30

in-patients with keratomalacia, none of whom showed any signs of other diseases. None of the out-patients with xerosis complained of pains or disturbances other than the eye changes at the time of blood examination.

Tables 1 and 2 give the results of blood sedimentation at the end of the first and second hours.

Six of the seven patients with keratomalacia showed normal blood-sedimentation figures, below 9 mm. after one hour, according to Fahraeus³, or border line figures of 4 to 7 mm., ac-

cording to Westergren. Only one showed a moderately increased and already pathological sedimentation velocity of 12 mm. after one hour.

Seven of the fifteen patients in table 2, that is, cases with xerosis of conjunctiva and cornea, Bitot's spots, and hemeralopia (all males, except case 5) showed a pathological increased sedimentation velocity at the end of the first hour of 15 to 48 mm.; three of them even showed strong pathological figures above 30 mm., according to Westergren. The eight remaining patients

Table 2

CASES WITH XEROSIS OF CONJUNCTIVA AND CORNEA. WITH THE EXCEPTION OF CASE 5, ALL PATIENTS ARE MALE. BLOOD WAS TAKEN IN THE AFTERNOON

Case	Symptoms of vitamin A deficiency in the eyes	Blood sedimentation	
		After 1 hour	After 2 hours
1	Xerosis of conjunctiva and cornea in severest degree; phlyctenules	48	74
2	Xerosis of the conjunctiva and cornea, Bitot's spots, and phlyctenules	40	78
3	Xerosis of conjunctiva and cornea, phlyctenules, perforated marginal ulcer of cornea	35	55
4	Xerosis of conjunctiva and cornea, Bitot's spots, and phlyctenules	29	60
5	Xerosis of conjunctiva and cornea, phlyctenules	28	54
6	Xerosis of conjunctiva and cornea, with severe pigmentation; phlyctenules	27	41
7	Xerosis of conjunctiva and cornea, phlyctenules	15	21
8	Xerosis of conjunctiva, with marked pigmentation	7	24
9	Prexerosis of cornea. Pigmentation and wrinkling of conjunctiva	5	10
10	Xerosis of conjunctiva, with prexerosis of cornea	6	16
11	Xerosis of conjunctiva with phlyctenules	3	9
12	Xerosis of conjunctiva, phlyctenules	2	3
13	Xerosis with phlyctenules	2	3
14	Only Bitot's spots, otherwise conjunctiva and cornea normal	5	13
15	Hemeralopia and only slight pigmentation of conjunctiva	4	10

of table 2 showed normally low figures, 2 to 7 mm.

In table 3 and table 4 are given the figures for control examinations in the course of healing of keratomalacia and

as long as three months, and his sedimentation figures were at this time as low as at the first observation.

In table 4, all the five patients (cases 1, 3, 4, 5, and 7) with xerosis and path-

Table 3

CONTROL TEST OF CASES WITH KERATOMALACIA
IN THE HEALING STAGE

No. of cases according to table 1	Date of reexamination	Blood sedimentation	
		After 1 hour	After 2 hours
2	First examination	4	10
	After 1 day	6	16
	After 7 days	7	16
	After 3 weeks	5	16
	After 3 months	3	5
3	First examination	5	8
	After 1 day	6	10
	After 2 days	9	11
	After 8 days	11	20
	After 2 weeks	20	46
	After 4 weeks	25	60
4	First examination	5	15
	After 2 days	8	20
	After 1 month	10	20
5	First examination	6	11
	After 11 days	15	29
6	First examination	7	20
	After 18 days	8	25
	After 1 month	7	20

xerosis treated with cod-liver oil at intervals of several days up to three months. The treatment in the out-patient clinic consisted of doses of 30 c.c. of cod-liver oil daily. The in-patients were given the same dose of cod-liver oil and a diet rich in vitamins.

In table 3, three of the five patients with keratomalacia and normal sedimentation figures at the time of the first observation showed pathologically increased sedimentation velocity even after beginning treatment with cod-liver oil and proper food (cases 3, 4, and 5). One patient (case 2) had a slightly but not pathologically increased sedimentation velocity after beginning treatment, and only one patient (case 6) showed practically no changes in sedimentation velocity before and after treatment. Only one patient could be examined at an interval

Table 4

CONTROL TEST OF CASES WITH XEROSIS IN THE
HEALING STAGE

No. of cases according to table 2	Date of reexamination	Blood sedimentation	
		After 1 hour	After 2 hours
1	First examination	48	74
	After 3 weeks	79	113
3	First examination	35	55
	After 15 days	25	48
4	First examination	29	60
	After 4 days	24	50
	After 11 days	25	52
5	First examination	28	54
	After 7 weeks	55	93
7	First examination	15	21
	After 11 days	17	37
8	First examination	7	24
	After 4 months	6	17
11	First examination	3	9
	After 7 weeks	11	26
13	First examination	2	3
	After 11 days	3	5
15	First examination	4	10
	After 2.5 months	3	8

ologically increased sedimentation figures at the time of the first observation showed also pathologically increased sedimentation figures at the time of reexamination performed after treatment with cod-liver oil at an interval between several days and one month. In two of these cases (cases 1 and 5) the sedimentation figures were found even much higher at later reexamination than those obtained at the time of the first observation. Three of the four patients with normal blood sedimentation figures in table 4 (cases 8, 13, and 15) at the time of the first observation showed also at reexamination time, after proper treatment, normal sedimentation figures, and only one of these patients (case 11) had a slight-

ly increased sedimentation figure after seven weeks.

According to the above finding, avitaminosis A does not seem to influence the suspension stability of the blood cells to any considerable degree. The pathological figures of increased sedimentation velocity found in the first seven cases of table 2 could hardly be attributed to changes in the blood condition caused by vitamin A deficiency, because, even after the treatment with cod-liver oil and later when all the visible xerotic changes in the eye had entirely disappeared, pathological figures were still found present at examinations performed as late as several weeks after treatment.

One point seems to be remarkable regarding the patients listed in table 2 showing pathological signs in the sedimentation test, i.e., the xerotic changes in the eye were greater than in those cases with normal sedimentation figures. All of these patients with pathological sedimentation showed also extremely large and numerous phlyctenules, which are generally though not always seen as a reactive response of tuberculous and scrofulous persons to different kinds of irritation involving the eye. From this it may be concluded that the increased sedimentation velocity in almost half of the cases with xerosis may be caused by general tuberculosis in which increased sedimentation velocity in certain stages is a well-known fact. But simple scrofulous and phlyctenular diseases of the eye are usually not associated with increased blood sedimentation velocity as shown by the findings of Franceschetti and Guggenheim⁴ and Schmelzer⁵.

Considering these reports, and in view of the countless conditions which influence the blood sedimentation time, it is difficult to maintain the point that tuberculosis is the cause of the increased sedimentation velocity occurring in some of the xerosis cases, unless it is admitted that the association of avitaminosis A with tuberculosis is responsible for such increased sedimentation velocity. This, however, is again

contradicted by the fact that the sedimentation velocity was also found increased after healing of the xerotic condition, as mentioned above. In comparison with the normal findings in blood sedimentation figures in keratomalacia, not complicated with other diseases, the blood picture is also approximately normal (Pillat and Yang⁶).

These negative findings on blood sedimentation changes in cases of keratomalacia before beginning treatment, and in half of the cases of xerosis, make it worth while to discuss at this place the pros and cons of the different changes in the blood condition influencing the blood sedimentation as found in a large mass of literature (Westergren⁷, and Katz and Leffkowitz⁸). It is also important to correlate these changes with other alterations in the blood appearing in keratomalacia. Whether the sedimentation figures in avitaminosis A are normal, because the constitution of the blood in avitaminosis A is normal, in view of suspensibility of the blood cells, or whether there are different changes in the blood which compensate each other causing a normal stabilization of the blood cells, cannot be determined. It is just as difficult to detect what influences are responsible for the increased blood sedimentation velocity occurring in the first healing stage of adequately treated keratomalacia. The time when the blood sedimentation velocity in these cases returns to its originally low value could not at all be concluded from one patient (case 6 of table 3) who was the only one available for a reexamination after three months to show a return to an initial value of blood sedimentation.

Finally it should be mentioned that Franceschetti and Guggenheim, and Schmelzer, found increased sedimentation figures in *ulcus serpens*, while in our cases of keratomalacia, a condition somewhat like *ulcus serpens* combined with hypopyon, the sedimentation figures are practically normal. If this striking finding that a small single disturbance in the body like *ulcus*

serpens may influence the blood sedimentation time, a point to be confirmed by further examinations, then the different findings on blood sedimentation in *ulcus serpens* and keratomalacia may serve in uncertain and rare cases as a differential point of diagnosis between these two corneal diseases.

Summary

1. The blood sedimentation test was done in twenty-two patients with vitamin A deficiency diseases, seven of them suffering from keratomalacia, and fifteen with xerotic changes in the eye of different degrees of severity, one patient having only hemeralopia.

2. Six of the keratomalacia patients showed normal sedimentation figures.

3. Eight of the fifteen cases with xerosis also showed normal sedimentation figures.

4. The increased figures in seven cases of xerosis must be attributed to complications caused by other diseases, because the sedimentation figures, even after healing of the visible changes of the eye after cod-liver oil treatment, showed also pathologically increased sedimentation velocity.

5. The sedimentation velocity of the cases with keratomalacia increased after starting treatment with vitamin A.

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AN AUXILIARY SUTURE IN MUSCLE TUCKING

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The uncertain element of stretching after a tucking operation is provided for by means of two additional sutures, loosely tied, and which may be drawn as much tighter as desired a week after the operation.

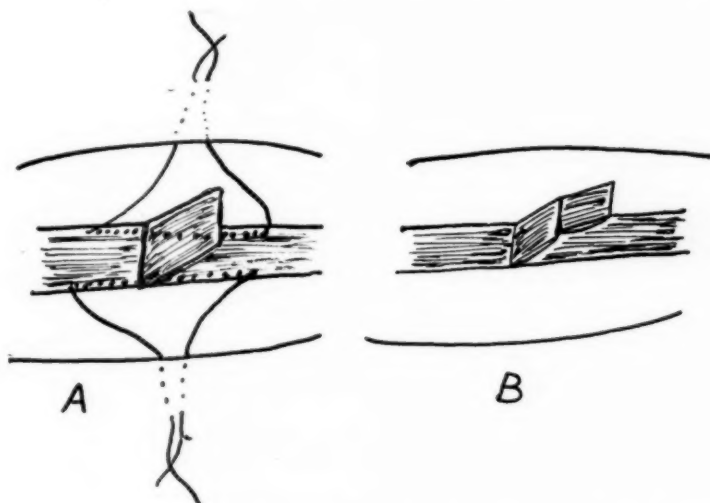
The results of a tucking operation may be eminently satisfactory or not, depending quite often on the correction of the last six or eight degrees. Even by the recently devised methods of measurement, with which certain lengths of muscle are taken up according to such factors as the amount of squint, and the results of the duction tests, an incalculable element of stretching often remains to mock the operator afterward.

With the idea of overcoming this unpleasant tendency I place two loosely tied sutures beyond the tied tucking sutures while the instrument is still in place. Two number-five braided silk strands are doubly armed. The needles of one strand are inserted along the lower border of the muscle from the bulbar side. One needle is inserted 4 mm. behind the tucker and the other 4 mm. in front; both are continued through the superimposed conjunctiva. The ends of the suture are brought

together over the conjunctival wound, and are tied loosely outside. The other suture is placed similarly through the upper border. Care must be taken to bring the sutures far enough out in the conjunctiva to allow the flaps to unite. The emergence through the conjunctiva should place each arm of the suture close together, so that if the sutures are needed they will not buckle a portion of the conjunctiva, causing an unsightly lump after they are tied.

The sutures can be reached a week after the operation and pulled taut or to any degree of tightness necessary to gain the added correction desired. They may then be left for ten days longer and removed from the outside, for they are on the surface of the healed conjunctival wound. If the added help from the sutures is not needed they may be removed easily; they do not interfere with the progress of healing in the least.

2600 Union Central building.



Auxiliary suture in muscle tucking (Brown). A, sutures untied; B, sutures tied.

THE OCCURRENCE OF EYE LESIONS IN TUBERCULOUS PATIENTS

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After reviewing the literature as to the infrequency with which pulmonary and ocular tuberculosis can be demonstrated in the same patient, the author reports two cases of uveitis occurring in young women while they were under sanatorium care for active pulmonary tuberculosis. In each case the condition cleared up, leaving only a chorioretinal scar, and with complete restoration of vision. Read before the Brooklyn Ophthalmological Society, October 23, 1930.

There is very general agreement in the literature that tuberculous eye lesions are rarely found among patients under treatment for active pulmonary tuberculosis in sanatoria and other institutions. When, however, patients with eye lesions that are definitely diagnosed as tuberculous are given a careful general physical and x-ray examination, quiescent or healed lesions are not infrequently found in the lungs, and still more frequently in the tracheobronchial and hilus lymph glands.

Finnoff¹, in his article in the American Encyclopedia of Ophthalmology, writes as follows: "The majority of cases of eye tuberculosis are secondary to tuberculosis in some other portion of the body. These primary foci are not necessarily very active and may not produce constitutional symptoms, but at the same time may be capable of discharging a few attenuated organisms into the general circulation which may find favorable surroundings for their growth in the eye. There they may produce an active ocular tuberculosis. It is also probable that the toxic products of these organisms may have some influence in the production of lesions in certain tissues in the eye."

In 1923 and 1924 Finnoff² reported the production of ocular tuberculosis in rabbits by the injection of tubercle bacilli into the carotid artery. When living bacilli were injected, the ocular lesions were of a severe and progressive type, and did not correspond to the types of ocular tuberculosis that usually occur in man; but in the exceptional, milder cases, tubercles of the iris and choroid, similar to those seen in man, developed. When dead bacilli were in-

jected, similar eye lesions were produced; but they ran a chronic course, progressing to a certain stage and then gradually disappearing with scar formation.

On the basis of his experiments, Finnoff³ concluded that in the great majority of cases eye tuberculosis "is hematogenous in origin and must be secondary to a tuberculous focus elsewhere in the body". He believes that this primary focus in man is often in the bronchial lymph nodes, although "it may be in the lungs or elsewhere".

Stark⁴ in 1923 reported his experience to the effect that ocular tuberculosis, especially chronic lesions of the uveal tract, is most frequently associated with latent tuberculous foci in the lungs or lymph glands. He believed that these pulmonary and glandular lesions "are of so trifling a nature that they are not producing enough toxin to stimulate the development of antibodies. The bacilli have become attenuated and are less virulent than those producing the initial lesion, so that when an infection from one of these foci enters the blood stream, there is little resistance given to its invasion of other parts".

Krückmann⁵ in 1929 noted that in sanatoria and clinics where active cases of pulmonary tuberculosis are treated, years may pass without a single case of ocular tuberculosis being observed. In eye clinics, where ocular tuberculosis is of relatively frequent occurrence, careful examination usually shows a tuberculous focus elsewhere in the body. In Krückmann's opinion, lesions of the pulmonary parenchyma are not generally the primary focus in ocular tuberculosis, but the hilus glands are

usually found to be infected and probably are very frequently the primary focus. Such pulmonary lesions as are found in cases of ocular tuberculosis, in his experience, are usually entirely quiescent, healed or calcified.

Lloyd⁶ (1930) is of the opinion that "we should consider tuberculous eye patients as victims of tuberculosis in some organ like the lungs or the bronchial lymph glands originally, with the eye lesion secondary thereto and but a part of the whole disease". He has observed cases in which tuberculous eye disease ran a chronic course with many relapses and which finally developed pleurisy with effusion (tuberculous), tuberculosis of the peritoneum or tuberculous meningitis, which often terminated fatally.

In older persons with subacute iritis of a tuberculous nature in whom vitreous opacities also may develop, Lloyd believes that "careful physical examination will often show an active lesion in the lung or elsewhere, and after a year or two the patient dies of tuberculosis in the thoracic or abdominal cavity". In the twelve cases cited by Lloyd, there is no instance in which a pulmonary lesion was definitely demonstrated; but one of the patients developed pleurisy with effusion, followed in a few months by a fatal peritoneal tuberculosis.

In the same number of the American Journal of Ophthalmology, Suker and Cushman⁷ reported a clinical study of sixteen cases of ocular tuberculosis watched for periods ranging from six months to two and a half years. Their observations seemed to support the belief that chronic inflammatory conditions of the eyes are often tuberculous.

Witkina⁸ in 1926 reported that at the Tuberculosis Institute of Leningrad, Russia, among 2,000 patients with pulmonary tuberculosis there was no case of ocular tuberculosis, and in a group of clinics in Leningrad and vicinity, with a total of 17,000 patients with pulmonary tuberculosis, there were only two cases.

In forty-two cases of ocular tuberculosis referred to Witkina by various

ophthalmologists, he found tuberculous lesions in the lungs in twenty-one cases; in all but three cases these lesions were in the first stage, and in the three they were in the second stage. The diagnosis was made on the basis of the x-ray findings, clinical symptoms being absent or slight. In addition, there were five cases with involvement of the bronchial glands and six with pleuritis sicca.

In a study of 1,000 patients in a tuberculosis sanatorium, Glover⁹ in 1930 found no case of tuberculous iritis. In 500 cases in which fundus examinations were made, one case was diagnosed as tuberculous retinitis, but without finding retinal tubercles. There were two cases of phlyctenulæ in children (associated however with rickets), while fourteen percent of the boys and fifteen percent of the girls showed lens changes.

In the Municipal Tuberculosis Sanatorium in Chicago, Goldenburg and Fabricant¹⁰ in 1930 found but three cases of uveal tract tuberculosis in 1,073 tuberculous patients, and but nineteen cases with possible tuberculous eye lesions in 914 cases in which fundus examinations were made. In other words, only two percent of these sanatorium patients showed possible tuberculous lesions of the eye, and in many of these the diagnosis was doubtful.

Grönholm¹¹ in 1928 reported that at the eye clinic in Helsingfors, 100 cases of chronic ocular tuberculosis, involving chiefly the uvea and iris, were found in the last four years among approximately 30,000 admissions. Careful physical and x-ray examination showed evidence of pulmonary tuberculosis in only eighteen of these cases. This, Grönholm notes, "is in conformity with the general experience that ocular tuberculosis is an almost unknown disease at the sanatoria for pulmonary tuberculosis". Tuberculosis of the cervical and bronchial glands, however, was found in fifty-five cases. The pulmonary and glandular tuberculosis was not of the active type in these cases.

Grönholm concludes that "ocular tuberculosis preferentially, or at any

rate fairly often, attacks apparently healthy, vigorously built and well nourished individuals with an abated, healed, or at any rate fairly benign tuberculosis in some organ, most frequently in the lymphatic vascular system, more rarely in the lungs; whereas ocular tuberculosis never . . . occurs in cases of active malign tuberculosis".

Burch¹² in 1921 reported six cases of ocular tuberculosis, in two of which x-ray examination showed pulmonary lesions, although neither patient showed clinical symptoms. In one case there was an iridocyclitis, with roentgenological evidence of an old fibrotic lesion in the apex of the right lung; in the other, a retinal tubercle with x-ray evidence of the tuberculous foci in the right apex and enlargement of the bronchial glands on the right side.

Friedenwald¹³ in 1923 reported six cases of ocular tuberculosis, in two of which a tuberculous focus was found in the lungs. In one case of tuberculous iritis there was an old tuberculous lesion in the right lung; in a case of tuberculous chorioretinitis a "tuberculous apical focus" caused no symptoms.

Thompson¹⁴ in 1925 reported four cases of ocular tuberculosis (keratoiritis and iritis), in one of which there was active pulmonary tuberculosis with cavity formation, and in another was evidence of a tuberculous fibrosis in the upper lobes of both lungs without clinical symptoms. In the first case the eye lesions showed marked improvement as the pulmonary condition abated under general treatment.

Werdenberg¹⁵ in 1927 reported that a roentgenological examination of the chest was made in 120 out of 180 cases of ocular tuberculosis under his observation. In ninety of these 120 cases, the x-ray film showed slight or very slight changes in the lungs—hilus shadows and small apical foci with correspondingly slight physical signs. In thirty cases the pulmonary lesions were more advanced. There was considerable infiltration and in some cases

cavity formation; the physical signs and clinical symptoms were correspondingly more marked; some of these cases showed hemoptysis, others attacks of pleurisy, and in nine a fatal tuberculous meningitis developed.

A special study was made of twelve cases in which the roentgenological evidences of pulmonary changes were slight and physical examinations for pulmonary tuberculosis had been negative before the patients came under observation. In all these cases there were signs of former pleurisy as well as enlargement of the hilus glands and unilateral or bilateral foci in the apices. In all these cases Werdenberg also found slight but positive physical signs which corresponded to the roentgenological findings.

The eye lesions in this group were iridocyclitis in seven cases, uveitis in two and choroidal lesions in three. Werdenberg concludes that in most cases of ocular tuberculosis the pulmonary lesions are slight and of a benign character, but that careful examination will show such a lesion to be present as a rule.

Wilmer¹⁶ in 1928 reported six cases of ocular tuberculosis, in two of which (both tuberculous uveitis) examination showed old (fibrotic) tuberculous lesions of both lungs.

Gay¹⁷ in 1930 reported thirty cases of ocular tuberculosis treated with tuberculin, in all of which a definitely positive cutaneous tuberculin reaction was obtained to small amounts of old tuberculin (usually 0.01 to 0.001 mg.), but no definite evidence of tuberculosis elsewhere in the body was found.

In the case of acute tuberculous periphlebitis of the retina and optic nerve reported by Goldstein and Wexler¹⁸ in 1930, there was acute generalized miliary tuberculosis (including pulmonary involvement).

Verhoeff¹⁹ in 1930 reported a case of tuberculous iritis in a man, sixty-four years of age, who had been blind for more than twenty years from retinitis pigmentosa. The iritis clinically resembled acute rheumatic iritis and caused so much pain that the eye was

enucleated. Microscopical examination showed small recent tuberculous foci in the iris with a fibrinous exudate in the pupil.

The patient had no clinical symptoms of pulmonary tuberculosis, but x-ray examination showed far advanced tuberculosis of the right apex and a healed area in the left apex. There was a history of repeated attacks of pleurisy. Verhoeff is of the opinion that the acute ocular reaction in this case may have been due to an allergic condition of the patient toward tuberculous toxins.

Lerner²⁰ in 1930 reported seven cases of ocular tuberculosis, five of them in children and two in adults. In the five cases in children, hilum tuberculosis was demonstrated by x-ray study in all but one; in addition, in one case there was x-ray evidence of an early pulmonary tuberculosis involving the upper lobes. In the two adult cases, x-ray examination showed obsolete pulmonary tuberculosis and calcified hilum glands in one case, and tuberculous lesions of the tracheobronchial lymph nodes, but no invasion of pulmonary parenchyma, in the other.

Both the cases with eye lesions which I observed at the Brooklyn Home for Consumptives occurred in young women with active pulmonary tuberculosis. In each, the condition was an iridochoroiditis which cleared up, leaving a localized chorioretinal scar, very slight vitreous haze, and with a complete restoration of vision in the affected eye.

Case 1. A.A. aged twenty years, suffering from advanced tuberculosis was first seen by me on November 18, 1929. There had been a progressive blurring of the left eye for a period of about two weeks. She had had no previous eye trouble of any kind. Vision right eye 20/15. Vision left eye 20/200. Under homatropin dilatation there were seen many spots on Descemet's membrane of the left eye; the vitreous showed a dustlike haze and beyond the macula a large area of acute choroiditis was observed.

A thorough check up of her physical condition was made, but no evidence of

any focus of infection or constitutional condition except for the pulmonary tuberculosis was unearthed. Treatment was instituted and on January 9, 1930, two months after the onset, her condition was practically as you find her tonight. Vision 20/15 in each eye. Refraction under a cycloplegic showed two diopters of hyperopia, for the correction of which glasses were ordered.

Case 2: J.F., aged twenty-nine years, has far advanced pulmonary lesions and cavity formation. I saw this young woman first on November 29, 1929, at which time she had, in the left eye, an acute iritis of less than one week's duration. Within a few days after the first examination spots appeared in the corneal substance and the vitreous became so cloudy that fundus details were quite obscured. This patient also failed to have any demonstrable disease or infection other than consumption. On December 28th, less than four weeks after the onset of her inflammation, the eye had become white, and the vision had returned to normal, although there was a very faint but definite vitreous haze. She had no refractive error. With the clearing of the vitreous a small localized area of choroiditis was found in the periphery to the nasal side of the disc and somewhat below.

The Brooklyn Home for Consumptives has a constant population of from 100 to 120 inmates, including children. It would seem that, if ocular lesions of tuberculous origin were at all common in consumptives, I should have seen vastly more than two cases in a period of six years' service. My own experience seems to bear out the statement of Grönholm that "ocular tuberculosis is an almost unknown disease at the sanatoria for pulmonary tuberculosis".

It is also worthy of note that at no time did I see a case, among either children or adults, of phlyctenular disease at this institution.

Summary

This review of the literature tends to show that tuberculous eye lesions are exceedingly uncommon in patients with phthisis. On the other hand, when

persons with ocular tuberculosis are examined roentgenologically, a fair proportion of them show evidences of hilus or tracheobronchial, if not of early pulmonary, tuberculosis.

Only these two cases of ocular tuberculosis were observed in six years of service as ophthalmologist to the Brooklyn Home for Consumptives. Both occurred in young women. In each case the pulmonary lesions were advanced but there was complete recovery so far as the eye condition was

concerned. During the same period not a single case of phlyctenular conjunctivitis was observed among these patients.

The consensus of opinion supports the view that, while ocular tuberculosis is probably hematogenous and secondary to a focus elsewhere in the body, most often the tracheobronchial or hilus glands, the primary lesion is almost always slight, quiescent, healed, or calcified.

1 Nevin street.

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HERPES AND ALLIED CONDITIONS

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With case reports illustrating the course of ophthalmic herpes, the literature of the subject is reviewed, and special consideration is devoted to a summary of the investigations made by various workers regarding a possible relationship between herpes and the number of other more or less obscure conditions. Read before the American Academy of Ophthalmology and Otolaryngology, October 27 to 31, 1930.

"There is scarcely any cutaneous disease which may not be seen occasionally on the eyelids. Herpes I have often met with, both in children and adults. It runs its usual course of about a fortnight, leaving pits, like those of smallpox. Not infrequently it attacks the cornea, a vesicle having its seat there, ending in an ulcer." (Mackenzie, "A practical treatise on the diseases of the eye," fourth edition, 1854, page 149.)

Hutchinson seems to have been the first to describe herpes zoster ophthalmicus in detail. He states that Rayer had reported a single case, that the Danielssen and Beck atlas of skin diseases contained an excellent portrait of a case, and that there was a very good wax model in the Guy's Hospital collection. In addition, the quotation from Mackenzie which opens this article completed the list of available material on the subject in Hutchinson's time.

It seems strange that this clear-cut clinical entity, with such serious visual curtailment in sequence, failed to enlist the interest of an earlier clinician, for it certainly never went unnoted. Hutchinson believed the eye escaped unless the cutaneous branch of the nerve supplying the side of the nose was involved. He reported three groups of cases to support this idea, but the rest of his observations have been amply confirmed. He noted the pain in the cutaneous area involved, even before the eruption appeared; the corneal ulceration with visual loss due to the scar; and the appearance of the corneal ulceration after the skin eruption, not before or with it.

Horner called attention to an increase of temperature of the skin and an increased sweating of the affected skin area with reduced intraocular ten-

sion. Wyss was the first to examine the gasserian ganglion, and he found round-cell infiltration, small hemorrhages, and degeneration of the nerve fibers running to the first division of the fifth nerve. A few years later Sattler confirmed these observations, which ought to convince everyone that measures directed toward relief of symptoms caused by malfunction of the end organs connected with diseased ganglion cells should be supplemented by treatment directed toward the cause or the site of the primary lesion. From time to time cases complicated by optic nerve atrophy, paralysis of some or all of the branches of the third nerve, permanent or prolonged loss of sensation of the affected cornea, enlarged pupil with sluggish reaction, and other trophic effects have been added to the literature.

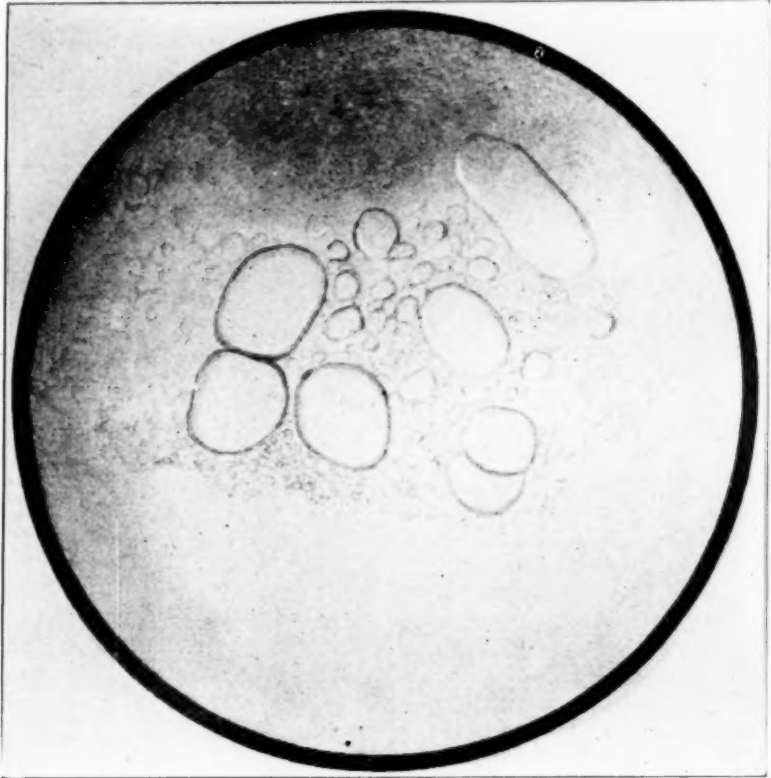
In contrast with the usually severe herpes zoster ophthalmicus is the milder corneal ulceration without skin eruption bearing the title of herpes cornea febrilis. It occurs after antityphoid injections, vaccination, therapeutic inoculations of malaria, salvarsan injections, pneumonia, malaria, and cerebrospinal meningitis, and even with common colds and herpes of the upper lip or nose.

The blister of this disease type contains a virus that can transmit the disease to the rabbit cornea, while the zoster blister does not do this. The eye symptoms of herpes zoster ophthalmicus are secondary to the virus acting upon the Gasserian ganglion. They are due to trophic changes with secondary infections, while the febrile type is the result of direct action of a specific virus upon the end organs and other tissues of the cornea, with secondary infec-

tions, an important factor. While the febrile type may be just as severe in its effects upon the cornea, iris, and vision as the zoster it is usually milder and may leave very light traces behind.

Both of these forms of herpes are rare as compared with dendritic keratitis in its various forms. This is an eruption of a group of very fine blisters

sions produced on rabbit corneas have produced typical dendrites, and scrapings from this type on the human cornea have given the same results as the herpetic blister. Since the type of grieppe that appeared here first in 1918 has held sway, there seem to be many more dendritic ulcers than before that date.



(Lloyd). Slit-lamp picture of fish-skin surface of cornea in herpetic keratitis. The dark area at the top of the picture is the pupillary area, indistinctly seen because it is out of focus.

that lose their epithelial covering and link up to form a linear ulcer resembling a small branch of a tree. Corneal sensitivity is lowered or lost, presenting a picture like zoster on a small scale. It may begin very suddenly with a sharp sting or a burning sensation that makes the patient think something has been blown into the eye. While it may develop without any indication of other disease or definite cause, it often follows grieppe and grieppe colds. Inoculations of the human cornea from le-

Because of the blister formation, despite the larger size of the lesions, bullous keratitis soon came into this grouping (with all secondary types such as are found in glaucoma or degenerative conditions of the eye, and the type associated with constitutional diseases, with blisters on the skin, placed by themselves in a quite different class). The painful corneal lesions characterized by epithelial shreds, known as filamentous keratitis, were considered an accidental group only,

but not distinct from the bullous forms.

Animal experimentation and exfoliation after apparent healing of traumatic corneal ulcer suggested strongly that this condition likewise belonged to the herpes group. It is believed that trauma permits the penetration of a virus previously present in the subconjunctival sac, which in turn causes the local pain (often severe and out of all proportion to the apparent lesion) and the later blister formation and loss of corneal epithelium. Italian observers have investigated this condition and believe that there are those who might be classed as "herpes virus carriers". The virus is inert until it passes the epithelial barrier.

No one has been able to isolate a germ or other specific agent, because stains show nothing and the virus will pass through a filter. If fluid from an herpetic vesicle is introduced into certain animals (such as guinea pig, rabbit, or white mouse but not the dog or white rat), the corneal lesions appear, irrespective of the manner or site of introduction. A type of encephalitis also develops, and if the virus is introduced in one conjunctival sac the second eye is affected much in the way in which sympathetic ophthalmia happens. Some investigators have also been able to produce lesions much like impetigo contagiosa. This herpetic virus can be passed through cultures or animals and remain true to type, but certain samples seem to affect the nerve side of the organism more than the cutaneous, while others have an affinity for the skin.

These experiments, the frequency of herpetic lesions after grippe, and the occurrence of postgrippal lethargic encephalitis are the basis of the belief that the virus of herpes is the agent to be blamed for lethargic encephalitis and the other infectious nerve ailments, including multiple sclerosis, acute ascending paralysis, poliomyelitis, and poliomyelitis superior.

Herpes seems to be an infectious disease, because it is generally accepted that an attack of shingles protects

against other attacks, and the relapses of herpetic lesions of the cornea can be explained on entirely different grounds which will be discussed later. Clinical experience with cases beginning as dendritic keratitis or herpes corneae febrilis, and which later pass into what conforms to every requirement for a diagnosis of disciform keratitis, inclines us to the view that this is also of the herpetic group. Either this is a new clinical entity or disciform keratitis is at times featured by ulceration and a loss of corneal sensation. Many observers in Europe now class this unique condition as the result of local injury, allowing entrance of the virus to the deeper tissues of the eye, whence it may penetrate the Gasserian ganglion and other cerebral tissues by traveling along the nerve sheaths or even along the vessels.

The slit-lamp gives much valuable information in connection with this large group of corneal lesions and teaches the importance of regarding every eye afflicted in this way as unable to protect itself against invading organisms or the evil effects of exposure to air and dust. Practically every case of the group has a lowered corneal sensitivity and very evidently a lowered vitality that requires constant closure and covering of the eye, both indoors and out. If the initial lesion heals, for some time the cornea is below par, and until the normal sensibility has returned the cornea should be protected and a local antiseptic used to keep the conjunctival sac free from dangerous agents.

If we were allowed to select but a single method of treatment for herpetic cases, my selection would be the constant covering of the closed eye. Next to this measure is the application of radiant dry heat to the open eye, and the most satisfactory form for the usual case is the glowing heat given off by the so-called infrared lamp. This lamp, also known as the thermolite, has a large carbon spiral that never gets hotter than the cherry red stage. It should be placed twenty inches from the patient, with the rest of the face and fore-

head protected by thick towels, and the affected eye directed steadily at the glowing spiral for fifteen minutes at a time. These séances can be repeated four times a day. The glowing heat from these lamps is said to represent only the infrared rays, but no proof of this has come to my attention.

In some cases, especially the severe types of ophthalmic herpes, the Shahan thermophore is the best treatment for ulcers that refuse to respond to other methods of treatment.

The best local antiseptic seems to be optochin in a one-half or one percent solution. This is entirely a clinical demonstration, and no experiments in the laboratory have been made to confirm or deny, but the results are certainly more pleasing with this than with mercurochrome or argyrol.

The pain of herpes zoster in the eye is not usually severe unless the deeper structures are invaded, but pain in the temporal region is often agonizing. It is usually much worse at night, and the only thing that reaches the pain of severe herpes zoster ophthalmicus is an application of the x-ray. The dosage must be rather heavy but not more than a single application is necessary to produce marked benefit. A second or third application may be required later.

It seems that an increase of intra-ocular tension is usual in these severe cases and the x-ray has a most favorable influence upon the tension also. In the section given to case reports these features will be noted. If the corneal ulcers are present, it is wiser to omit the tonometer and to depend upon the fingers, even if we expose ourselves to the criticism that the digital method is inaccurate and unscientific. The alternative is the knowledge that we may have done harm to a cornea lacking vitality.

The after effects of severe herpes are indeed severe. The most usual damage is corneal scarring, both deep and wide. The slit-lamp, during the acute stage, shows a fish-skin cornea with flakes of opacity throughout the deep corneal layers, and deposits upon the posterior surface of the cornea indicating ciliary

involvement. Synechiæ are frequent and permanent. In some cases the iris is eventually thinned decidedly and the color changed to an extent deserving the name of heterochromia. The pupil is rather regularly larger than its fellow, and the more severe the case the greater the disparity and the longer its persistence.

What happens in the interior of the eye is usually concealed from view by the corneal opacity or by the deposits in the pupillary area. Optic nerve atrophy and paralysis of some of the muscles supplied by the third nerve happen now and then. The older the patient the more severe the case, and it is not very unusual to find a severe case of herpes suffering for a year or so, with severe headaches at night and a general debility that is out of all proportion to the visible signs. The danger of drug addiction is added to the other unpleasant features of these cases, but the number of deaths, even among older patients, is fortunately small.

Herpetic lesions of the eye are much more numerous than is generally conceded, and the advice of Theobald to employ a little wisp of cotton to pick out the case with lowered corneal sensation has been neglected. Nor has the rôle of corneal hypesthesia and of the associated loss of corneal vitality been appreciated. The average case of dendritic keratitis will heal under protection of the eye and the use of a local antiseptic. As soon as the patient is relieved he insists upon exposing the eye, which cannot withstand the drying effect of exposure to the air nor the hazards of city air with myriads of minute dust specks everywhere. A relapse follows or the case may pass into disciform keratitis.

Fluorescein is rather generally used to detect the minute ulcer of whatever kind, but it is never so useful as in showing up the minute ulcer of dendritic keratitis in the very early stage. If this same dye is used in the earlier days of disciform keratitis minute breaks in the surface epithelium can be easily demonstrated, if several minutes pass between the instillation and

the observation. The slit-lamp is especially useful in showing the minute defects and the final diffuse staining after the dye has had an opportunity to soak in. Retroillumination will set off the minute ulcers to advantage, but direct illumination shows the staining better.

One of the symptoms recorded occasionally during the course of herpes ophthalmicus is increased intraocular pressure. Some observers seem to think that this increase of pressure within the globe accounts for the pain, and operations have been done to relieve the tension. While the number of cases with increased tension that have come under my observation is not great, the relatively high percentage of increased tensions has led me to believe that we ought to expect this rise of tension in any severe case of herpetic keratitis (herpes zoster ophthalmicus and herpes corneæ), and also in severe keratitis dendritica that in its later stages takes on the aspect of disciform keratitis.

Of all the herpetic group none is more rare than superficial punctate keratitis. Of this condition but two or three cases have been seen in twenty years. The classic features of this disease are the minute superficial erosions scattered here and there over the cornea, their tendency to remain for some time, the total absence of any deeper or more severe sequelæ, and the association with bronchial conditions. A type of subepithelial elevation covered by sound epithelium which permits no staining is seen now and then, and is much more frequent than the classic type described above. The cornea loses its clearness. If protected, it seems to recover slowly; and very little is left behind to show that at one time the cornea was liberally sprinkled with these minute elevations that are only semiopaque and never at all dense. Nothing has been discovered as to cause or as to a treatment superior to the customary protection and local antiseptic. Gradle has described a subepithelial punctate keratitis (a good name for this type), but whether it is really of this herpetic group is not yet settled. The punctate keratitis first

mentioned seems to be a member of the herpes group, because lesions of its type have been experimentally produced in animals.

The conclusions that seem to flow from the discussion may be epitomized as follows: Herpetic lesions of the cornea seem to be quite common, and especially after grippe and grippe-colds. An outstanding symptom quite characteristic of all of these lesions, including the traumatic case, is the lowered sensibility of the cornea, which is easily detected by drawing a wisp of cotton across the corneas of the two eyes for comparison. With this lowered sensation is associated a lowered trophic influence, permitting the entrance of a virus that rapidly reaches the deeper parts of the eye, leaving a permanently damaged cornea. The corneal sensation is slow to return, and in severer cases remains permanently below normal. The so-called relapses are the results of damage to the surface epithelium by dirt or by exposure to air currents which a normal cornea is well equipped to withstand but which is too severe a test for a cornea with lowered vitality. Glaucoma of the lesser degrees is often found in the severer cases of this group but rarely requires an operation, as both the tension and the accompanying pain can be controlled by moderately heavy x-ray therapy. If these patients are told why and how the relapses occur and are supplied with a local antiseptic and the proper eye covering, further trouble can be practically eliminated, but there are some who can learn by severe experience only. The period during which these relapses can occur is certainly as long as three years and probably more. The slit-lamp will distinguish the dendritic ulcer, even in the early stages, when to the naked eye or the loupe it is without definite characteristics. The blister is the characteristic sign of herpes and may be minute or large, but trophic disturbances and lowered corneal sensation are of equal or greater value in establishing the diagnosis, because they persist after the blister has healed.

A type of profound keratitis with all

of the appearances of disciform keratitis belongs in this group and has been under observation from a minute initial dendritic ulcer to the final stages, and also without the initial ulcer. The density of the cloud is usually the result of continued exposure of the eye through ignorance or disobedience, after the corneal opacity has formed. The initial crop of blisters in dendritic keratitis seems to appear with such suddenness that many patients are sure there is something in the eye and seek its removal. So small may this group of blisters be that it is easily passed over unless a stain is instilled or the slit-lamp used.

Laboratory experiments strongly suggest the virus of herpes as the cause of both dermatropic and neurotropic entities, including such nerve diseases as poliomyelitis, polioencephalitis superior, multiple sclerosis, and acute myelitis. Both clinical and laboratory experience agree that among the dermatropic effects of this virus should be included not only herpes zoster ophthalmicus and herpes corneae febrilis but also dendritic keratitis and its various forms, disciform keratitis or a type of keratitis profunda like it, keratitis bullosa vesiculosa and filamentosa (when not caused by degenerative eye disease like glaucoma absolutum, nor by a profound systemic disease), superficial punctate keratitis, and finally the relapsing traumatic ulcer.

If we can influence our patients to protect the affected eye for a few days after the removal of a foreign body, and also whenever corneal sensibility is below par, the relapsing traumatic ulcer and the more serious corneal opacities that inevitably follow invasion of the deeper corneal layers can be avoided or minimized.

Genuine ophthalmic herpes often produces such dense corneal opacities that the eye is useless for more than detection of motion or large objects. In many cases this never returns to normal, and in most cases there are periods of high and lower resistance, which must be taken into account if the patient is to avoid further trouble.

Case reports to illustrate the clinical aspects of herpes and allied conditions

Case 1: Severe ophthalmic herpes zoster, with increase of tension and severe pain relieved by x-ray therapy. Relapse of ulceration occasioned by premature exposure; permanent loss of sensation of cornea. Mrs. M. K., aged sixty years, twelve weeks ago had an eruption of herpes in the hair area of the right frontoparietal region and six weeks later the right eye became involved. When she was seen first the cornea was clouded by a large scar with much thickening of the deeper layers. Numerous anterior synechiae and the corneal sensation much reduced. Eye is not painful now but there is severe pain in the temple at night. Very moderate ciliary injection.

Tension recorded by Schiötz instrument was 35 and 18 mm. respectively. The patient complained bitterly of the pain at night and seemed very much depressed. Pilocarpin, eserine, and cocaine solution was instilled in the eye to relieve the tension, moist heat applied, and mercurochrome one percent solution instilled. When fluorescein was instilled into the conjunctival sac, and a few minutes allowed to permit the dye to penetrate, minute defects in the surface epithelium became evident.

Ten days passed without relief of pain or of the mental depression, when Dr. W. H. Dieffenbach gave one deep x-ray treatment with immediate relief of pain. The tension was reduced to 21.5 and 15 mm. respectively. One month later the eye was white, the cornea insensitive, and the tension 15 to 18 and 18 mm. respectively. The pupil was larger than its fellow and immovable. The adhesions could not be seen because of the cloudy cornea with much pigmented deposit upon its posterior surface. A fish-skin surface was seen when the slit-lamp was used.

Twice after this observation the patient insisted on going about without the shell over the eye and at once small ulcers developed. Two years later the patient returned for observation; she was quite comfortable. There was no

pain or redness, the corneal scar was thicker than ever, and the surface much less sensitive than the other. For visual purposes the eye was useless.

Case 2: This case was said to have begun with "something that flew into the eye". Disciform keratitis (or keratitis profunda) with recurring dendritic ulcers, severe pain in temple, and moderate elevation of tension relieved by x-ray therapy.

About three weeks before his first visit the right eye suddenly began to sting and burn as if something had blown into it, but the physician visited by him could find nothing. Immediately thereafter the vision was blurred, the eye moderately red and painful. When he came here the eye was red, the cornea hypesthetic, no apparent ulceration, but minute defects visible after fluorescein instillation. The slit-lamp showed the typical fish-skin surface with diffuse specks scattered throughout the cornea and some large clumps on the posterior corneal surface.

The presence of adhesions suggested the use of atropin, but in about two weeks this was stopped because of increased tension, according to the Schiötz instrument, as follows: 25 to 30 and 15 to 18 mm. respectively for the right and left eyes. The pain in the side of the head at night became very severe.

The patient could not be persuaded to wear an eye patch and in a few days an ulcer of the cornea appeared internal to the pupil and typically dendritic. In three or four days this had healed, but the patient did not wear the patch any longer than the eye pained and relapses occurred. A single x-ray treatment relieved the pain, and the finger test indicated satisfactory progress as to tension, but because of corneal ulceration and the difficulty in healing no tonometer was used.

From this point on the case was featured by repeated ulcerations, slow healing and relapses. A large superficial ulcer would not heal; but during my summer vacation Dr. James Andrew saw the patient in consultation and promptly closed the case by using the Shahan thermophore. One year

later the corneal sensitivity was seemingly as acute as that of the other but the eye was of little use because of dense corneal opacity.

Case 3: After-effects of herpes corneæ resembling heterochromia. Mrs. A. M., aged fifty-eight years. During past year vision of left eye has been failing and it is now counting of fingers only, mainly because of corneal scars with diffuse clouding. Moderate redness, no evident ulceration but fluorescein shows many fine defects. This cornea is hypesthetic, surface is typically fish-skin, there are "bubbles" here and there near the surface, and many pigmented clumps on the posterior corneal surface. There are many synechia and the lens is decidedly cloudy. She had been to physicians for the original attack of "ulcer" of the cornea, but thereafter had attended to the eye herself.

The eye was protected and a local antiseptic used. This restored it to its normal whiteness but without improvement in vision. During the succeeding year the iris color faded and the slit-lamp showed very plainly the white radiating lines containing the blood vessels, not covered by pigmented tissue, as is the normal state. She must now and then cover the eye even indoors to avoid the irritation and redness and minute defects that develop otherwise.

Case 4: Dendritic keratitis developing during an attack of antral disease. Mrs. M. L., aged forty-two years. Three weeks ago the eyes bothered her a great deal. Both were somewhat red, vision blurred, and both lower lids puffy. The left antrum contained pus, and it was later shown that there was a pansinusitis, but only the left antrum contained pus. Soon after the operation to drain the affected antrum a typical dendritic ulcer appeared on the left cornea, preceded by severe local pain and lacrimation. This ulcer healed promptly under protection, moist heat, and local antiseptic. The case is quoted as an example of the disease occurring during nasal accessory disease, of which type

the literature contains a number of examples.

Case 5: Relapsing traumatic ulcer of unusual severity. E. C., aged twenty-one years. Struck left cornea with whisk broom last night. At first visit has a large superficial ulcer of the left cornea with much photophobia and lacrimation, and a small pupil. The other eye sympathizes so that he has had difficulty in getting about. The ulcer was cauterized with pure carbolic acid, argyrol instilled, and local heat employed, but it was two weeks before the ulcer healed, and three weeks more before the eye could be exposed to light and air with comfort. All was well for four months, at the end of which time exfoliation recurred over the entire lower half of the cornea, after it had been struck by the corner of a theater program. The entire raw surface was brushed with pure carbolic acid, the eye covered, and atropin instilled, with relief of irritation in four days.

The relapsing ulcer history usually includes either a long period between the accident and the employment of protection to the eye or other treatment; or there may be a record of the subject striking the eye with something which, from the surgical point of view, is decidedly unclean. The finger nail is the commonest cause, but in this case the original wound was inflicted by a very unclean object, a whisk broom. The only feature of the second ulcer, out of keeping with the conditions was the size of the exfoliation.

Case 6: Dendritic keratitis, with every appearance of disciform keratitis, and recurrence several years after initial lesion. A E., aged thirty-five years, said something flew into eye four days ago. The eye was painful, moderately red, teared profusely, and there was an ulcer at the five o'clock position with much surrounding corneal clouding. The slit-lamp showed this clouding to be due to a number of striæ in the deeper corneal layers, running in all directions from the site of the lesion, and the surface was typically fish-skin. The eye had not been protected at all up to this time. This ulcer healed promptly and the corneal clouding cleared, leaving

but a small patch of clouded cornea over which the fish-skin surface was plainly seen. There was also a lowered sensitivity of this cornea.

Three years later the patient reappeared with a history of something in the eye a month before. After this had been removed the eye was more or less irritable, and when he was examined the characteristic fish-skin surface, with vacuoles here and there, could be found with the slit-lamp. There was a large disc of opacity in the cornea, apparently beneath and not on the surface. Fluorescein stained the deeper layers only after some minutes, but no actual point of entry could be made out. The lesion was below the pupillary area, so there was no effect upon the vision.

Three months after healing of the second lesion this pupil was much larger than the other and the cornea remained less sensitive. The illustration shows the affected area of this cornea, which is typical of the corneal surface after dendritic and herpetic keratitis. In some cases the individual flat elevations are very small, but in other cases they may be mixed with the larger spots as in this case.

Résumé of laboratory experiments with herpes virus

Grüter seems to have first shown that the contents of a herpes febrilis blister could reproduce its characteristic lesions upon the cornea of the rabbit. He did this in 1912, and in a year or so Kraupa, with his advice, was also experimenting along these lines. Löwenstein made his results public in 1920, and since then a large number of investigators have been interested in the ever widening aspects of a problem that seemed unimportant, but now is so inclusive that each group or investigator can only handle a part of the work.

The technique employed began with cleansing of the surface of a blister. This was then carefully opened and the contents carried on a narrow knife to 5 c.c. of normal salt solution. From this standard solution from the upper layers some fluid was carried on a knife with which two parallel lines were made on the cornea to be tested.

The contents of a zoster blister, of a burn blister, of an eczema pustule, or of pemphigus gave a negative result. But the virus from the blister of febrile herpes gave consistently characteristic results. The wound is without irritation for sixteen to twenty-four hours; at thirty-six hours there is strong ciliary injection and photophobia with considerable secretion in the conjunctival sac. Many fine blisters may be seen along the edges of the wound. These increase in number at right angles to the wound, often duplicating the tree-like branches seen in practice. By this time the cornea is completely anesthetic. The disease reaches a climax in six to eight days.

The disease may be carried from one rabbit to another, and Grüter did this no less than twenty-three times consecutively. The virus is easily killed, one-half hour at the temperature of 56 degrees C. (132 degrees F.) destroying it completely, but the solution above described when diluted two hundred times was still effective. If a cornea recovers from one infection a sort of local immunity is established, which for some time protects against reinfection. It is generally believed by laboratory experimenters that the virus will pass through a filter, but there is no general agreement on this point. A double coccus is found in the blister contents, but its significance is in doubt.

Microscopic examination of rabbit corneas at different stages is illuminating and shows a loss of superficial epithelium as the first effect. There seems to be an accumulation of fluid in the upper layers of epithelium, with a great many very fine granules that are found nowhere else. There is a strong tendency to the formation of vacuoles in the cells, with deformed nuclei still to be seen. Stargardt calls this the "balloonizing degeneration". Blisters are formed thus and the upper epithelium is stripped off, but until the parenchyma is bared it remains in good condition. When a considerable area has been stripped, Bowman's membrane melts, the exposed parenchyma splits up, and the surface parts becoming glassy and stain badly. The paren-

chyma away from this process is infiltrated with polynuclear eosinophilic leucocytes. Despite the lost tissue the affected cornea is much swollen and occupies more space than the original area. Descemet's membrane and the endothelial lining remain unaffected and there is no increase in fixed tissue cells. This pathology is in harmony with slit-lamp and direct observation.

Stocker instilled the virus in the conjunctival sac of the rabbit. This merely prolonged the incubation period, but did not alter the effects. Luger and Landa successfully infected the human cornea and A. Fuchs and Landa repeated the experiment. Levaditi, Harvier, Nicolau, and Doerr found in the human saliva a virus that seemed to be closely connected with the epithelial cells therein.

The local immunity gained by recovery from an infection is not limited to the eye operated upon but also covers the opposite eye. The virus of encephalitis confers immunity against herpes and vice versa. After an animal or a human being has recovered from an attack of herpes, the conjunctival sac still carries the virus. Doerr and Vochting found that the virus entered the aqueous but did not go into the vitreous. Gifford and Lucic introduced herpes virus into the ciliary body of one eye of a guinea pig and uveitis on both sides followed. From the second eye another animal was infected with similar results.

Six percent of the experimental animals developed herpes on the opposite cornea. Autopsies upon these animals showed that the route by which the infection traveled from the first to the second eye was along the optic nerve to the chiasm and then to the opposite eye. Various investigators have experimented with different aims in view. Some have tried to show a similarity between herpes and lethargic encephalitis, while others have traced a relationship to impetigo contagiosa, cowpox, and chickenpox. The experiments do not work out alike for all animals, nor for the same animals with different experimenters.

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Research references

(Note: In the Transactions of the American Academy of Ophthalmology and Otolaryngology, 1930, the reader will find the full bibliography presented to the Academy with this paper. The list given below is limited to references dealing with research as to the etiology of herpes.)

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ARSENICAL EXFOLIATIVE KERATITIS

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This is the most serious of the cutaneous complications encountered in the treatment of syphilis. A very small quantity of neoarsphenamin solution was expelled into the tissues around the vein at the elbow. After one month the resulting generalized dermatitis began to involve the eyes. In each eye the ulcerated cornea ruptured, with expulsion of the crystalline lens. Read before the Pacific Coast Oto-Ophthalmological Society, September 5, 1930.

The literature on the subject of which this paper treats is necessarily not voluminous, for the neoarsphenamin has been used for only a generation.

It was in 1909 that arsenic was first used in the form of salvarsan, or 606 of Ehrlich, in the treatment of syphilis; it was tried intravenously, but the reactions were so pronounced that this route was abandoned and the intramuscular method adopted. In 1913 Ravaut announced that neoarsphenamin could be used intravenously with comparative safety and without severe reaction in the majority of cases; and since that time this has been the method of choice.

Occasionally, however, more or less severe disturbances followed the use of this form of medication, and it is upon the ocular manifestations of one of these severe disturbances (exfoliative dermatitis), that this paper reports.

No attempt will be made here to enter into a full description of exfoliative dermatitis and its treatment; this is for the syphilographer and the internist. It is, however, necessary to us as ophthalmologists that a résumé of the subject be presented, so that we may get a background for this paper.

We are all familiar with the many more or less common manifestations of syphilis in the ocular structures. We also realize that antisyphilitic treatment with the arsphenamines must be cautiously instituted and watchfully carried out. But the condition reported was so unusual and was so disastrous in results that it behooves us not only to be constantly alert ourselves, but also to report the case for the benefit of those who are daily treating syphilis.

In the Archives of Ophthalmology, September, 1928, Zimmermann reports

many ocular conditions frequently activated by the arsphenamin treatments, and tabulates a bibliography of fifty-seven references; in only one case was there a serious corneal complication, perforating ulcer.

The exact etiology of exfoliative dermatitis is not known. Any substance used either subcutaneously, intramuscularly, or intravenously in the treatment of syphilis may cause a severe skin reaction, and each has caused an exfoliative dermatitis. We have also recognized the fact that the great majority of these reactions follow the more or less frequent injections of some of the arsenicals, especially arsphenamin or neoarsphenamin. Neither the reactions themselves nor their sequence follow a definite course. In some cases the skin only is affected; in others the mucous membrane of the upper respiratory tract is more or less involved, while in others the eyes may be affected to a greater or lesser degree. In the case which I am reporting, following the use of six doses of 0.6 gm. each of neoarsphenamin or neodiarsonal, all of these structures were widely and deeply involved with tragic results.

The following is the purport of Stokes's description of exfoliative dermatitis from arsphenamin: It is the most serious of the cutaneous complications of treatment of syphilis, and ranks second only to hemorrhagic encephalitis as the most fatal of all unavoidable complications of a properly conducted arsphenamin therapy. It is not sharply separated from the other types of cutaneous reaction, but may be heralded by an attack of multiform erythema, or urticaria, either immediately before, or one or two injections preceding the dermatitis. As a rule,

however, true exfoliative dermatitis from arsphenamin follows a rather definite course, which may be described as follows:

(1) Severe itching of the skin on the day following the injection.

(2) Slight punctate subcuticular flush about the trunk, neck, and flexures on the day following injection.

(3) Appearance of patches of dermatitis at the flexures or upon the shins and about the face. These may be present for some days or even a week or two before the explosion.

(4) Marked signs of cutaneous irritability and toxic effect in the form of other acute eruptive phenomena such as erythema of the scarlatiniform or morbilliform type. The chill and fever of such an attack may be the first symptom of a severe dermatitis.

(5) Marked indications of systemic intolerance, such as severe gastrointestinal reaction after each injection, with a feeling of prostration in the intervals and slight yellowing of the scleræ. (My case showed none of the above symptoms until he was hospitalized.)

Second stage: Usually within twenty-four hours after injection a general flush appears, most marked over the face and trunk, with patches of dry or slightly oozing dermatitis, especially in the flexures and dependent portions of the body, such as the feet and pretibial region. Itching is usually severe, and the seriousness of the outlook may be to some extent gauged by the severity of this symptom. Edema of the skin becomes marked, especially on the face and legs, with a deepening flush and extending dermatitis. Edema, intense itching, oozing, and a deep purplish lividity of the dermatitis are the earmarks of a severe attack. The general irritability of the patient is greatly increased, and during the first three or four days it is almost impossible at times to secure his cooperation. Chilling becomes very pronounced, due in part to the tremendous cooling effect of the cutaneous vasodilatation. The patient's teeth may chatter in a room too warm for ordinary comfort. So continuous is this symptom that it may be

difficult to recognize the really severe chills which often accompany the appearance or extension of intercurrent infection. Such infection is often of the respiratory type. Fever may or may not be present (it appeared in two-thirds of our cases, half just before and half during the dermatitis), but in the most severe cases usually reaches a peak of 102 to 103 degrees, following a chill; and then subsides to the diurnal rise and fall of a septic temperature.

Third stage: When the dermatitis becomes universal, the process settles down to a long course, seldom less than eight weeks, and often as long as twelve or more.

The skin, at first deep red, edematous and oozing, becomes browner, drier, more leathery, and scaling. The patient rapidly loses weight, and the skin, excoriated by scratching, hangs in folds. The hair thins and the nails usually are lost. (This was not so in my case.) Secondary inflammatory and infectious processes, such as furuncles, mastitis, and broken-down glands, develop. Adenopathy becomes general. The serous and mucous surfaces are often involved. Obstinate conjunctivitis, stomatitis, involvement of the auditory canals with furuncles and plugging from detritus add to the misery of the patient. Decubitus must be watched for, especially in the emaciated and weak. Symptoms from the throat and respiratory tract are common, especially a tracheobronchitis. In patients who progress unfavorably a jaundiced tinge may appear, but the liver is rarely palpable. There may be signs of nephrosis, and a terminal exacerbation of infection; often a streptococcal pneumonia may close the scene. Diarrhea is an obstinate feature of some cases and is entirely absent in others.

In patients dying in the acute or second stage, grave changes in the viscera indicating acute arsenical poisoning occur, as in the case reported by Latham. The blood picture in the fully developed case is usually that of leucocytosis with relative increase of polymorphonuclear neutrophils or with an eosinophilia. The eosinophilia has

been reported to reach as high as sixty percent.

Fourth or convalescent stage: The things that herald approaching convalescence are: Resumption of sweating, which seems to be almost completely suspended, so far as visible perspiration goes, during the height of the attack; improvement in appetite and spirits and decreasing irritability; disappearance of swelling; appearance of islands of paler skin, especially about the chest and over the knees; decreased scaling and thinner and larger flakes; disappearance of edema and leathery thickening (lichenification) from the skin. The face and extremities are usually the last to clear, and the hair may completely fall out before it and the nails come in again. For weeks after the patient is almost entirely cleared up, the feet will become purplish and edematous if the patient is about on them for several hours. Itching is slow to disappear, partly because the patient acquires the scratching habit; he maintains the thickening and lichenification by rubbing and scratching more or less automatically rather than in response to definite itching. Pigmentation, varying from a slight mottling to a deep bronzing, may persist for some time, but ultimately clears up. At times the patient's complexion seems actually better for the attack, but it is not uncommon for cutaneous irritability to persist for months and even years, expressing itself in patches of winter dermatitis on the legs or a seborrheic scaling in the scalp and on the chest. In such cases it is usually found that the patient was annoyed by dermatitis or had a seborrheic skin before the attack, and indeed that this was one of the factors predisposing him to his exfoliative reactions. In view of this statement it would be wise to inquire regarding any previous allergic reaction before beginning the use of the arsenicals.

In their beginnings these cutaneous eruptions must be distinguished from a Herxheimer reaction, or therapeutic shock. This latter is essentially an acute condition, usually reaching its

maximum in about eight hours. It is synchronous in time with the hours of greatest destruction of spirochetes by the drug, and is either an irritative reaction to an increased liberation of toxins by still living spirochetes, or to the proteid decomposition products and endotoxins resulting from their destruction.

Since the cause of exfoliative dermatitis is not definitely known, it is not to be wondered at that no specific therapy for this condition has been evolved. We do know that sodium thiosulphate intravenously and Fisher's solution by Murphy drip administered early have a very helpful effect.

I have corresponded with many of the leading ophthalmologists of the country; not one from whom I have heard has ever seen a case of exfoliative keratitis except Wheeler. Exfoliative keratitis is not mentioned in the textbooks on ophthalmology; and in the literature available to me for study and review only four cases have been reported in which serious disturbances of the cornea occurred.

Kirby of New York, in an exhaustive article on exfoliative keratitis, published in the Archives of Ophthalmology for December, 1929, mentions twelve types of keratitis in which there may be exfoliation with or without ulceration or necrosis, and reports two cases of his own and one seen in the service of Dr. John M. Wheeler at Bellevue Hospital in which exfoliation and ulceration occurred. He believes that the exfoliation of the cornea is expressive of the analogy existing between this complicating feature and the generalized dermatitis. His descriptions are almost identical with the appearances in my case.

Kirby says in the report of one of his cases: "On August 30, 1928, the general condition was greatly improved, but the corneal condition remained the same, and it was decided to make use of a method of treatment which Dr. John M. Wheeler had used on numerous occasions with great success in cases of recurrent dendritic or filamentous keratitis. The treatment is

mentioned briefly in Fuchs. To insure success, a definite procedure must be followed out. In brief, local anesthesia is used, cocaine two percent and holocaine one percent being employed by instillation. The lids are opened with a speculum and the conjunctival sac is gently irrigated. The globe is steadied with fixation forceps, and all the diseased or softened corneal epithelium is removed with the curette and with applicators. (These should be made by applying a small amount of cotton tightly with collodion and allowing it to dry before being used.) Iodine in 3.5 percent tincture is then applied on the tips of tight applicators (no excess). Bowman's membrane, where intact, remained smooth, but where softened, roughened or thinned took the iodine stain. A firm dressing was applied over both eyes. This was changed each forty-eight hours. After ninety-six hours from the surgical removal of the diseased corneal epithelium, the surface of the entire right cornea had healed over and was perfectly smooth. The left had healed except for a small area, about 2 mm. in diameter, in the upper nasal quadrant. This resisted all treatment and showed a slight spreading after four weeks; hence the operative procedure of removal of the diseased epithelium was repeated, with complete success. Both corneas have remained healed to date, ten months from the time of the operation. The corrected vision is now 20/20 minus in each eye.

"The second case with the same treatment gave a final visual result of O.D.—4.00 sphere combined with a plus 6.00 cylinder axis $165^\circ = 20/30-1$; O.S. +9.00 cylinder axis $170^\circ = 20/40-1$."

Case report: White male, twenty-six years, unmarried, presented himself to a physician for treatment on June 24, 1927, with a large specific ulcer of two weeks' duration, involving almost the entire sulcus of the glans. He was referred to a urologist, who returned a diagnosis of chancre. The patient had a plus four Wassermann reaction. The urologist advised intravenous injections

of neoarsphenamin (neodiarsenal) in 0.6 gm. doses weekly. The patient received this dose on the following dates: June 29th, July 6th, 14th, 23rd, 29th, and August 6th. In passing I should like to remark that all reported cases have occurred in midsummer.

At the last injection the patient jumped, so that a very small quantity of the solution was expelled into the tissues around the vein at the elbow. Twenty-four hours later his left arm became greatly swollen and painful, the swelling extending from the wrist to the shoulder and being of a hard, brawny type. This kept him from work for three days. When he returned to work there was only a little swelling around the elbow. Three days after this his elbow again became very red, tender, and swollen and he complained of "terrible itching". The condition did not improve and he was hospitalized on August 16th. I now quote hospital records.

August 17th: The swelling has extended again to shoulder and to fingers. Bichloride fomentations and butesin picrate ointment to arm.

August 18th: Swelling going down. Ultraviolet light treatment. Other treatment as yesterday.

August 20th: Arm seems more swollen and red again. Treatment same. Ultraviolet light treatment.

August 21st: Arm oozing. Treatment as before. Swelling less. Feeling better.

August 22nd: Has had a very comfortable day. Slight rash on body.

August 23rd: A reddish macular rash general over body.

August 25th: Patient feeling very miserable. Rash more intense.

August 26th: For first time temperature and pulse are elevated. Temperature 100.4° , pulse 120, respiration 18.

August 27th: Dressings changed to chlorazine solution and ammoniated mercury ointment.

August 28th: Swelling of arm much better. Legs feel stiff. Treatment continued.

August 30th: Various sized blebs on

legs and body. Very restless and irritable. Sedatives ordered yesterday.

August 31st: Some blebs have broken and are oozing clear serum.

September 1st: Temperature 103°, pulse 116, respiration 20. Sodium thiosulphate one pint by rectum, and by wet dressings to body and extremities.

September 2nd to 5th: Condition and treatment about the same.

September 6th: (Note beginning of eye complication.) Eyes red, sore, and painful. Boric acid fomentations and argyrol ten percent in eyes.

September 7th: Eyes looking better. Throat sore. Chlorazene gargle used.

September 8th: Complaining of very sore throat. Gargle frequently. Ice bag to throat. Eye treatment continued as above.

September 9th: Dr. Hyde called in consultation for condition of eyes, nose, and throat. The man's condition is pitiable. He has a temperature of 102 degrees, pulse 100, respiration 22. His entire body is greatly swollen and covered with crusts and oozing vesicles. His face is swollen beyond recognition. Eyes closed by swelling. The entire upper respiratory tract is intensely red and edematous. The patient's voice is very hoarse. The following treatment is being ordered: Sodium thiosulphate intravenously, ephedrin and mercurochrome spray for respiratory tract, atropin one percent in eyes, and boric ointment to lids after warm boric irrigations every three hours.

September 10th: General swelling of body less. Some of the oozing areas on body drying up and scaling. Eyes about the same. Treatment continued.

September 11th: The entire upper respiratory tract is covered with a thick, dirty yellow membrane entirely occluding the nostrils and rendering speech and deglutition difficult. The palpebral conjunctiva is also covered with this same membrane. It is difficult to see the eyes but the cornea is apparently intact. With lids held open, vision is apparently unimpaired. There is much mucopus discharge from eyes, nose, and mouth. Continue treatment.

September 12th: Eyes more swollen

and very tender, but nose and throat feeling better. Discharge from mouth and nose less. Body clearing but there are one or two superficial abscesses on leg and in groin.

September 14th: Patient slept about six hours. Says he feels generally better than for several days except for eyes, which are more swollen and tender. Examination difficult. Cornea is hazy. There are several small areas of exfoliation in each cornea, staining with mercurochrome, especially marked near limbus. There is also a beginning dirty infiltration around right limbus. Dr. Hoffman advises Fisher's solution and sodium thiosulphate.

September 15th: Condition about as yesterday, with exception of lids being more swollen. Dr. Hoffman advises sodium thiosulphate daily intravenously, two percent holocain solution for pain in eyes, Fisher's solution by rectal drip, and other treatment continued.

September 16th: Patient seems more comfortable. Eyes less swollen, especially right. Sodium thiosulphate 20 c.c. intravenously. Fisher's solution.

September 17th: About as yesterday. Sodium thiosulphate 10 c.c. Continue treatment.

September 18th: Eyes less swollen, less discharge; patient says he can see better, but limbal infiltration is deeper and more extensive in right eye and beginning in left. Sodium thiosulphate 20 c.c.

September 19th: Both eyes less swollen. Not so tender. Membrane thinning on conjunctivæ, nearly gone from mouth and nose, but infiltration around cornea extending in both eyes. Several localized abscesses have developed on legs and body. Opened under ethyl chloride. Patient slightly irrational.

September 20th: Patient had a fairly good night. Eyes not so swollen, can separate his lids. Complains that everything is dim. Discharge less, but cornea very gray and almost surrounded in both eyes by deep yellowish ring of infiltration. Patient transferred to Seattle.

He was at the Seattle hospital from September 20th to October 6th. Dur-

ing this period his highest temperature was 100.8°, pulse 100. Urinalysis showed a slight trace of albumen, with an occasional hyalin and fine granular cast. He was seen by Drs. Wurde-mann, Hoffman, and Goss; also by Dr. Peacock, urologist. Treatment consisted of saline irrigation of eyes every four hours, followed by liquid petrolatum. Sodium thiosulphate was continued. Emollient dressings to body which had undergone complete exfoliation, leaving many raw surfaces. General supportive treatment with various sedatives for sleep.

September 21st: This evening the right cornea ruptured superiorly at the limbus and the lens was found resting

on the lower lid. Vitreous in the wound.

September 22nd: This evening the left cornea has ruptured and the lens is presenting in rupture. There is an acute dacrocystitis on the left side.

September 25th: Dacrocystitis pointing outward with pus just under skin. Lens presenting more. Patient states that for two days everything has been "stone dark".

September 26th: Left lens lying on dressings.

The patient remained in the hospital until October 5th, when his general condition was much improved. He was discharged practically blind.

116 Laurel street.

SCLEROCORNEAL TREPHINING IN CHRONIC SIMPLE GLAUCOMA

Some interesting case reports

WILLIAM ZENTMAYER, M.D.
PHILADELPHIA

Five cases of chronic simple glaucoma in which sclerocorneal trephining was done are reported in detail as illustrating the frequently satisfactory results of this operation, and at the same time certain annoying complications and the occasional loss of the eye from late infection. (The principal features of each case are summarized at the beginning of the corresponding case record.) Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, April 17, 1930.

The following cases of chronic simple glaucoma in which sclerocorneal trephining was done are considered of interest clinically as illustrating:

1. The frequently satisfactory results of this operation.

2. An annoying consequence of this operation: transient marked changes in refraction.

3. A complication which does not always defeat the purpose of the operation, but which frequently interferes with the satisfactory visual results: quiet iritis.

4. The dreaded sequel of the operation: loss of the eye from late infection.

Case 1: Chronic simple glaucoma. Bilateral trephining with preservation of practically full form field and no enlargement of the blind spot for a period of ten and one-half years in one eye, and moderate contraction with marked enlargement of the blind spot in the other eye; also marked variations in the refraction of one eye and the disappearance of the glaucomatous cup in one eye.

C. B. W., aged sixty-three years, was seen first August 13, 1918, when he came for refraction. The visual acuity, fundus, and tension were normal; the anterior chambers were shallow. The refraction was right eye +2.00 +0.50 c. ax. 15, vision 6/5. Left eye +2.50 +1.00 c. ax. 180, vision 6/5. Exactly eight months later he returned stating that two months before he had first noticed a dimness in the right eye, principally in the lower part of the field, and that the attacks lasted an hour or more.

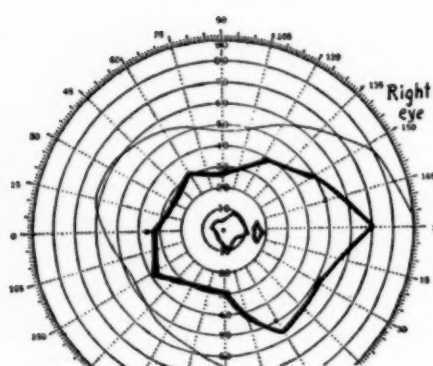
The only causative factor in these attacks appeared to be a strenuous use of the eyes.

In the right eye there was a round dense vitreous opacity and a moderately deep glaucomatous cup with a readily induced arterial pulse. In the left eye the media were clear, the disc was gray, and there was no cupping. Tension in the right eye was 83 mm. and in the left 42 mm. (Schiotz). Vision was 6/20 in the right eye and 6/9 in the left eye. He was advised to have an operation on the right eye. This was declined. Eserine 0.5 percent was prescribed.

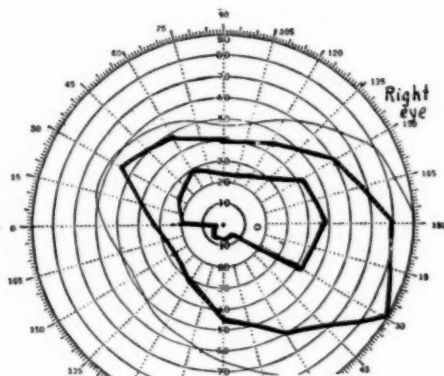
Under miotics the tension varied greatly, but continued high in the right eye. On June 5, 1919, a consultation was suggested and he saw Dr. de Schweinitz, who advised operation on the right eye, but the patient did not submit until October 4, 1919, when a sclerocorneal trephining was done; this gave an incomplete basal iridectomy. There was free hemorrhage into the anterior chamber and some into the vitreous. A mild iritis developed and synechiae formed around the lower border of the pupil.

On June 15, 1920, it was noted that the cupping of the disc had disappeared in this eye.

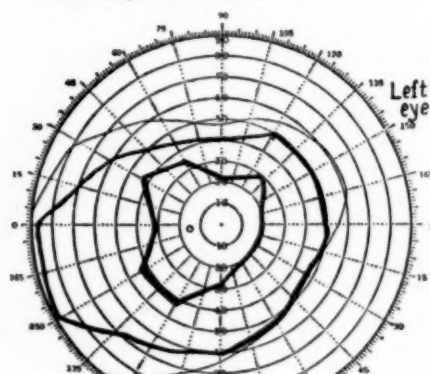
On October 19, 1920, a sclerocorneal trephining was done in the left eye. Recurring hemorrhages invaded the anterior chamber and vitreous. By November 9, 1919, these had cleared except for a few vitreous opacities. Tension in the right eye was 13 mm. and in the left 18 mm.



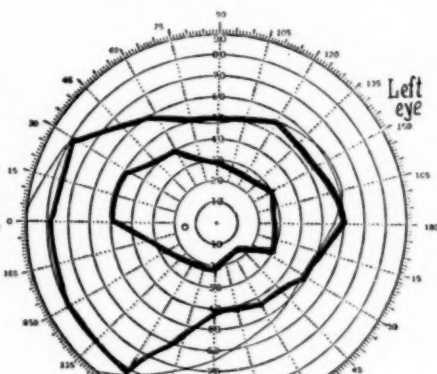
Case 1. - White and red. 10/330.
4.14.19.. At the time of the
first subjective symptoms.



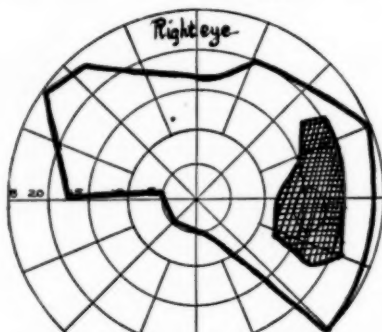
Case 1. - White and red.. 10/330.
3.29.30. 10½ years after oper-
ation..



Case 1. - White and red. 10/330.
8.30.20. Previous to operation.



Case 1. - White and red. 10/330.
3.29.30.. 9½ years after oper-
ation.



Case 1. - White field. 2/1000.
3.29.30. 10½ years after oper-
ation.

Fig. 1 (Zentmayer). Successive field charts of case 1.

In January, 1921, opacities were present in the periphery of the right lens just beneath the anterior capsule.

During the month of May, thanks to the good care of Dr. B. F. Baer, the patient got through an attack of acute catarrhal conjunctivitis of the left eye without intraocular infection.

By December, 1923, the optic nerves had become slightly atrophic and there was a moderate degree of retinal angiosclerosis; lenticular opacities had developed in the left lens.

In September, 1927, a beginning hyaline degeneration of the superficial layers of the cornea was noted at the extremities of its fissural area. The biomicroscope also showed pigment peppered over the walls of the anterior chamber. Tension in the right eye was 11 mm. and in the left eye 13 mm.

On April 10, 1930, the refraction in the right eye was $-0.50 +1.50$ c. ax. 145, vision 6/9 partly, and in the left eye it was $+0.50 +1.00$ c. ax. 165, vision 6/9 partly. The tension was 13 mm. in the right eye and 11 mm. in the left.

The hyaline degeneration had progressed and there was now a typical zonular opacity of Fuchs. The middle third was, however, faint. There were subcapsular changes in both lenses. In the right eye the pigment had disappeared from the anterior chamber, but in the left there was a very considerable amount on the anterior capsule of the lens and on the iris.

Field changes: In April, 1919, for the right eye the form field was concentrically contracted about fifty percent; there was an absolute scotoma down and in from fixation; the blind spot was normal. For the left eye there was a slight temporal contraction of the field.

At the time of the operation on the right eye, the form field under seven weeks of miotic treatment had gained approximately twenty degrees, but a nasal step had appeared in the color field and a large relative scotoma had appeared in a corresponding area in the form field.

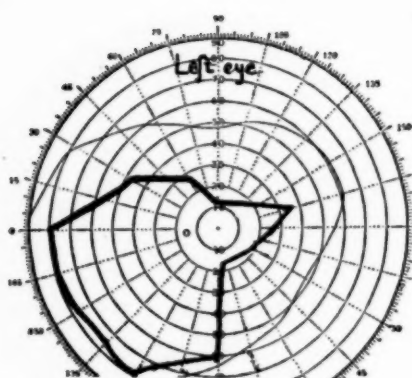
Just before the operation on the left eye, in October, 1920, there was a con-

centric contraction of ten degrees. In March, 1921, the right eye field showed an inferior nasal quadrant defect and a large relative scotoma in the remaining nasal quadrant; the right eye field also showed an enlargement of the blind spot and a Bjerrum scotoma for red. In the left eye the form field was unchanged from the time of operation.

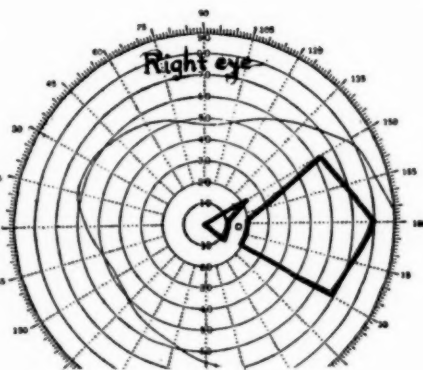
At the present time, April 1, 1930, in the right field, there is a nasal step with a contraction of the lower temporal field and a very large Bjerrum defect for form as taken on the campimeter, 2/1000. With a 10/330 object this shows only as a similar relative defect. In the left eye the perimeter shows an almost full form field with 10/330 object, but a considerable loss of the inferior half of the color field. With a 2/1000 object there is no enlargement of the blind spot. The tension has varied from 6 to 14 mm. in the right eye since the operation, and for the left eye from 5 to 25 mm.; mostly it has been between 7 and 10 mm.

Refractive changes: O.D.: before operation June 10, 1919, $+2.50 +1.00$ c. ax. 180. No marked change occurred until six years after operation: $+3.25 +0.50$ c. ax. 15. One year later it was about the same as on the date of operation. 8 years after operation, -1.00 ; $8\frac{1}{2}$ years after operation, -0.25 ; $9\frac{1}{2}$ years after operation, $+0.25 -1.00$ c. ax. 65; $10\frac{1}{2}$ years after operation, $-0.50 +1.50$ c. ax. 145, vision 6/9. O.S.: before operation October 19, 1920, $+2.50 +1.00$ c. ax. 180; 3 months after operation, $+3.50 +1.25$ c. ax. 45; 7 months after operation, $+5.00$; $1\frac{1}{2}$ years after operation, $+3.25 +0.75$ c. ax. 35; 2 years after operation, $+4.25$; 4 years after operation, $+2.75$; $4\frac{1}{2}$ years after operation, $+1.50$; $5\frac{1}{2}$ years after operation, $+0.50 +1.00$ c. ax. 20; $6\frac{1}{2}$ years after operation, $+1.75$; $7\frac{1}{2}$ years after operation, $+0.50 +1.00$ c. ax. 150; $9\frac{1}{2}$ years after operation, no change.

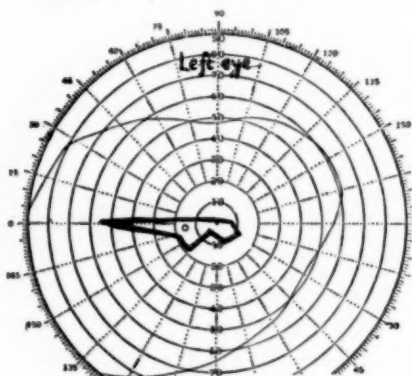
Case 2: Chronic simple glaucoma. Sclerocorneal trephining of the right eye. Iridectomy in the left eye. Marked variations and increase in static refraction in the trephined eye.



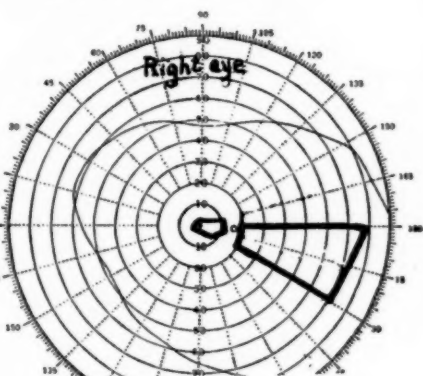
Case V. - Field for white. 10/330.
9.23.16. 1 year before operation..



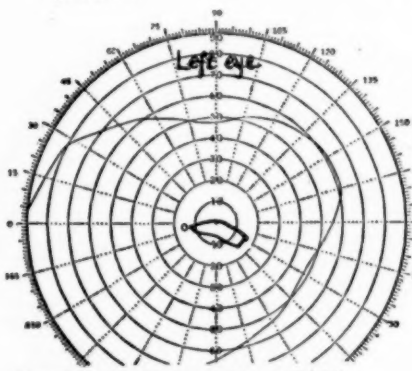
Case V. - Field for white.. 10/330.
9.23.16. 17 months after Elliot operation.



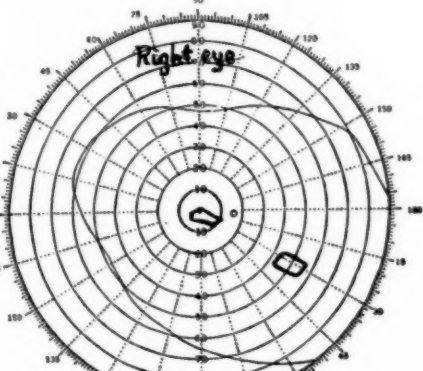
Case V. - Field for white. 10/330.
3.13.18. 3 months after Elliot operation.



Case V. - Field for white. 10/330
3.13.18. 3 years after operation.



Case V. - Field for white. 10/330.
3.20.20. 3 1/2 years after operation.



Case V. - Field for white. 10/330.
3.20.20. 5 years after operation.

Fig. 2 (Zentmayer.) Successive field charts of case 5.

This case, along with the previous one, illustrates the marked variations in refraction which may follow this operation.

Mrs. K., aged fifty-eight years, was first seen on May 24, 1928. She had been operated on for carcinoma of the cervix. A maternal first cousin had glaucoma.

Vision with glasses was, right eye, 5/15, left eye 5/5 partly; left hyperphoria five degrees; corneae small; pupils 5 mm.; anterior chambers deep; tension right eye 52 mm., left eye 38 mm., Schiötz. In the right eye the nucleus of the lens was hazy; disc overcapillarity; circumpapillary narrow atrophic zone; shallow glaucomatous excavation. In the left eye there was a broad spicule in the lens cortex down and in. The fundus was as in the right eye. Refraction: right eye -3.75 -2.00 c. ax. 105; vision 5/6 partly.

Left eye -2.00 -1.25 c. ax. 5, vision 5/5. With $+2.50$ added the near point for type 0.37 was at 26 cm. Glasses were prescribed with 1.5 D. prisms, bases up and down. The fields were taken on the perimeter with 10 mm. test object and showed a slight contraction for white in the right eye, and full field in the left eye. Pilocarpine, one grain to the ounce, to be used twice daily, and eserine, same strength, for bedtime use, was prescribed.

One month later the tension in the right eye was 33 mm., and in the left 30 mm. Eserine was substituted for pilocarpine. Despite increasing the strength of the eserine the tension increased to 38 mm. in the right eye and 33 mm. in the left. After omitting miotics for twenty-four hours the tension was 32 mm. in the right eye and 41 mm. in the left; but taken one hour after the instillation of a miotic, it was 36 mm. in each eye.

On January 29, 1929, a sclerocorneal trephining was done on the right eye; a complete iridectomy was obtained. The patient squeezed and a small bead of vitreous showed at the trephine hole. On February 4, 1929, a narrow iridectomy, no trephining, was done in the left eye. A moderate reaction followed

the operation on the right eye, but a severe intraocular hemorrhage occurred on the third night in the left eye. Two weeks after the operation the refraction was about the same as before the operation; the vision in the right eye was 5/15 and in the left 5/7.5.

There was a gradual increase in the myopia. One month after the operation it was: right eye, -6.50 -1.00 c. ax. 105, 5/15 partly; left eye -4.25 -0.75 c. ax. 5, 5/7.5 partly. Ten days later, on March 4, 1929, it was right eye -8.00 , 5/12, and left eye -4.25 -0.75 c. ax. 5, 5/7.5. The tension was 36 mm. in the right eye and 17 mm. in the left. Eserine was ordered for the right eye. Six weeks later, on April 10, 1929, the refraction was right eye -4.50 -3.00 c. ax. 120, 5/9 partly, and left eye -3.50 -0.50 c. ax. 5, 5/6 partly. Tension right eye 23 mm. and left 35 mm.

Marked variation in the tension occurred from week to week. On May 6, 1929, it was zero in the right eye and 30 mm. in the left. Two days later it was 10 mm. in the right and 22 mm. in the left. Eserine was discontinued in the right eye and ordered once daily in the left.

The fields showed in the right eye about thirty degrees contraction of the temporal field, and in the left eye a slight contraction in the lower temporal field. There were no central field changes. In the right eye with a -5.00 , vision was 5/7.5 partly, and in the left it was 5/6 partly.

On July 27, 1929, the refraction was right eye -5.75 -1.50 c. ax. 45, 5/12, left eye -3.75 -0.75 c. ax. 45, 5/6.5 partly. The tension in the right eye was 17 mm., and in the left 24 mm. Eserine was stopped. On November 18, 1929, the refraction was right eye -4.25 -2.75 c. ax. 125, 6/12, left eye -3.50 -0.25 c. ax. 90, 6/6 partly.

On December 28, 1929, with the same glasses, the vision was 6/12 partly in the right eye and 6/6 partly in the left. The tension was 13 mm. in the right eye and 22 mm. in the left. No miotics had been used since July, 1929. In the right eye there was considerable sub-

capsular opacity, and in the left there were spicules in the cortex, one of which extended into the pupillary area.

On March 27, 1930, the refraction was right eye -4.25 -2.25 c. ax. 125, 6/12, left eye, -3.75 -1.75 c. ax. 20, 6/5 partly. The tension of the right eye was 15 mm, and of the left 30 mm. The fields, taken about two years after the operation, showed no change in the peripheral fields in the past year, but a 100 percent increase in the blind spot of the right eye.

One year after operation, in the refraction of the right eye there was an increase in the myopia of 4.25 D. with the loss of an astigmatism of 2.25, and in the left eye an increase in the myopia of 1.75 D.

Case 3: Chronic simple glaucoma with sclerocorneal trephining of the left eye; immediate progressive loss of vision from a low-grade iridocyclitis which resulted in marked deposition of pigment over the tissues of the anterior chamber.

Mrs. F. P., aged seventy-one years, was referred to me on January 16, 1928, by an ophthalmologist in Saint Louis for diagnosis and treatment. There was a history of failing sight, halos and seeing red polka dots over a period of six or seven years. Though a diagnosis of optic atrophy had been made, miotics had been regularly used for a period of three years. Because of a supposed relationship between the ocular condition and a sphenoiditis which was present, both sphenoids had been exenterated by the late Dr. Sluder. In the right eye, with a -5.00 -0.50 c. ax. 180, vision was 6/15, and in the left with a -5.00 it was 6/30. The pupils measured 2.5 mm. The anterior chambers were very shallow. Tension in both eyes was 36 mm. Both eyes presented perinuclear lens opacities, shallow glaucomatous cups and slight enlargement of the veins.

Under ephedrine the pupils dilated to 6 mm. An indefinite macular degeneration was made out.

The perimeter field in the left eye, 10/330, showed a marked concentric contraction of form and colors. In the right eye the form field was contracted

to an irregular quadrangle form with a trowel-shaped color field of 10 by 30 degrees. On the campimeter, 2/1000, there was a ring scotoma varying from 8 to 10 degrees in width. In the left eye there was a double Bjerrum scotoma which did not, however, quite enclose fixation.

As a diagnosis of optic atrophy, due to sinusitis, had been made, and, as the case was one of glaucoma, it was thought that an operation was indicated. She was asked to see Dr. de Schweinitz, who concurred in both the diagnosis and the opinion and suggested a sclerocorneal trephining on the left eye.

The operation was done on January 21, 1928. An incomplete basal iridectomy was obtained. A rather severe iridocyclitis complicated the healing; it resulted in the formation of a synechia and a dense precipitate of pigment granules on the limiting structures of the anterior chamber. Tension was reduced to 13 mm.

Two weeks after the operation vision in the right eye with a -5.00 was 6/12 partly and in the left eye with a -3.00 it was 6/120; it had been 6/30 before the operation. When the patient left Philadelphia on February 23, 1928, vision was 6/12 in the right eye and 6/30 in the left. Tension in the right eye was 31 mm. and in the left 19 mm. There was some increase in the lenticular opacities.

The patient was seen in Saint Louis in October, 1928, at which time the vision was 6/25 in the right eye and 1/60 in the left. Tension was 20 mm. in the right eye and 15 mm. in the left. The field in the right eye showed a large paracentral relative scotoma. The appearance of the left eye was unchanged, except that there was now a large filtration bleb.

Case 4: Subsiding acute glaucoma in the right eye. Unsuccessful sclerocorneal trephining. Successful iridectomy. Chronic simple glaucoma in the left eye. Sclerocorneal trephining with pigment migration over the tissues of the anterior chamber and development of subcapsular opacities.

G. C., an interior decorator, aged

sixty, was seen on November 29, 1926. For the right eye there was a prodromal history of glaucoma of six years duration preceding the acute attack, which occurred four weeks before he consulted me. The attack was in the subsiding stage; no anterior chamber; tension very high, 70 mm.; vision doubtful perception of concentrated light. In the left eye tension was 25 mm., pupil 2.5 mm., and a beginning pathologic excavation down and out. There was 5.00 D. of hyperopia, vision 6/6 partly; without glasses, 6/40. The form field was full.

On November 30, 1926, a sclerocorneal trephining was done on the right eye. The eye did well, with a relief of symptoms, for three and one-half weeks; then the tension again increased, and averaged 55 mm. Six weeks after the primary operation, on January 3, 1927, an iridectomy was done on this right eye, and on January 11, 1927, a sclerocorneal trephining was performed on the left eye. Operatively, both eyes did well. The right eye has given no further trouble except that cataract has developed; the tension remains good; on July 24, 1929, it was 22 mm.

In the left eye a small peripheral coloboma and a fair filtration bleb were obtained, but the biomicroscope showed a great amount of granular pigment on all surfaces of the anterior chamber and some atrophy of the iris. Later a faint subcapsular opacity appeared in the lens.

One week after the operation, with a +2.00, vision in the left eye was 6/12, and two weeks after, with a +5.00 c. ax. 90, it was 6/30. Tension was 11 mm. Two and a half weeks after the operation, with a -2.50 +5.00 c. ax. 90, vision was 6/15. Four weeks after operation, with a +1.25 +3.50 c. ax. 105, vision was 6/6 partly. Seven months after the operation, with a +3.25 +0.50 c. ax. 120, vision was 6/6 partly, and one year after the operation, with +2.25, it was 6/9. Tension was 13 mm. At this time the biomicroscope showed much the same appearance in the anterior segment as before, with beginning opacities in the adult nucleus.

One and a half years after the operation, on July 24, 1929, with a +2.25, the vision was 6/6 partly. Tension was 11 mm. The field showed 10 degrees concentric contraction for form, and the blind spot a 200 percent increase.

He was last seen on April 15, 1930, when vision in the left eye, with +2.50 0.75 c. ax. 15, was 6/9. The biomicroscope examination showed no change from that noted soon after operation, and the tension remained unchanged.

In the left eye the fields for form and color were practically within normal limits. On the campimeter there was an increase of 800 percent in the blind spot.

Case 5: Chronic simple glaucoma. Bilateral sclerocorneal trephine operation. Loss of right eye by late infection and of the vision of the left eye through progress of the disease in six years time.

This patient was an itinerant laborer who was sent to me by the late Dr. Randolph of Baltimore, on March 15th, 1916. He had had a classical sclerocorneal trephining done on the right eye, by Dr. Hardy of Saint Louis, on April 15, 1915. The filtration bleb was large. The conjunctival covering was thin; the pupil responded promptly to light and the tension was 15 mm. There was a deep glaucomatous cup. With a +0.25 +0.50 c. ax. 90, the vision was 6/12. In the left eye the anterior chamber was very shallow. The pupil reacted promptly to light. Tension was 39 mm. The refraction was, +0.50 +0.50 c. ax. 90, vision 6/4. Deep glaucomatous cup. Miotics were prescribed. His stay was too brief for field taking.

On September 23, 1916, there was, in the right eye, a triangular field, extending from three degrees on the nasal side of fixation to the temporal side, and flaring out to thirty degrees above and below the horizontal meridian. This was divided in two areas by an enlarged blind spot. In the left eye the field was contracted about thirty-five degrees above and to the nasal side, and was well retained in the lower outer portion. Tension, right eye, 13 mm.; left eye, 45 mm.

Fifteen months later, in December, 1917, he returned after having worked in various cities of the East, stating that after an attack of grippe and malaria the right eye became inflamed and painful. Shortly thereafter attacks of fogging came on in the left eye in the morning and increased in density so that by noon he had to depend on his right eye to see. The right eye showed the sequelæ of an iridocyclitis. Tension was 12 mm. Vision was 6/15. The field was less flaring on the temporal side. In the left eye the vision was 6/15 and the field was reduced to a narrow horizontal triangle. Tension was 53 mm.

The left eye was trephined on December 17, 1917, and a small peripheral basal iridectomy was obtained. On January 5, 1918, the refraction of the right eye was practically unchanged and in the left eye, with a -5.00, vision was 6/8. On January thirty-first the left eye was emmetropic, vision 6/8. Tension in the right eye was 11 mm. and in the left 8 mm. The field showed still further contraction.

He was seen on the average of twice yearly, spring and fall, and showed a gradual loss of central vision and a contraction of the fields to a small retained central area. The tension in the left eye varied; at times it reached 27 mm. There was apparently no change in the refraction from -5.00 D.

On February 17, 1921, he returned with a Koch-Weeks conjunctivitis in the right eye. Despite advice to go into the hospital, he did not return again until on March 13, 1921. The right eye was then a picture of subsiding panophthalmitis and on May 28, 1921, the shrunken globe was enucleated. At this time the vision in the left eye was 6/20 and only a candle field of fifteen degrees remained.

I last saw him, on August 29, 1922, when he applied for entrance into the

Industrial Home for the Blind. His vision was then 1/60. The tension by palpation was normal.

Summary

The rapid, transient and marked changes in the refraction are difficult to explain. The first thought was that they might be due to alterations in the rate of filtration through the filtration scar, which could bring about a change in the position of the lens; but, according to Cowan, the differences in the refraction noted are too great to be thus accounted for.

Could an increase in the rate of filtration result in an increase in the index of refraction in the vitreous associated with the alterations in the permeability of the capillaries?

Regarding my experience, on the whole, with sclerocorneal trephining, I would say that this operation has given a fairly high percentage of cases in which tension was permanently reduced and an improvement in central and peripheral vision obtained. Still there was a considerable percentage in which, both as an immediate and as a remote result, the visual function of the eye was damaged.

This unfortunate outcome was due in some cases to a frank iritis, and in others to an insidiously persistent iritis with proliferations of pigment, along with a fibrinous deposit disseminated over the anterior capsule of the lens, which was visible in the pupillary area and in the coloboma. In a number, subcapsular opacities, anterior and posterior, sometimes developed early; and, difficult to explain, others developed later, probably from hypotony. Finally, loss of the eye from late infection resulted in two cases.

These are the reasons for my resorting to this operation less frequently than formerly.

1930 Chestnut street.

THE CONSTRUCTION OF A CAMPIMETER

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BROOKLYN

Careful directions and drawings are given for the construction of a satisfactory but inexpensive campimeter. Black charts for a standard instrument such as the stereocampimeter may be used.

The following directions and drawings for the construction of a satisfactory but inexpensive campimeter are submitted because the instruments on the market are often too expensive for some enthusiasts who would make themselves proficient in central field studies. The device is constructed so that the black charts for a standard instrument, such as the stereocampimeter, may be used, and it duplicates the conditions under which the plottings are made on that instrument. This is necessary if comparisons are to be made.

An effort has been made to produce a campimeter which can be used as a

stereocampimeter when that device is employed as a monocular instrument, its most useful arrangement.

The campimeter herein described has been tested out for over one year and has been found satisfactory in all respects within its scope. The drawings and directions may be submitted to an

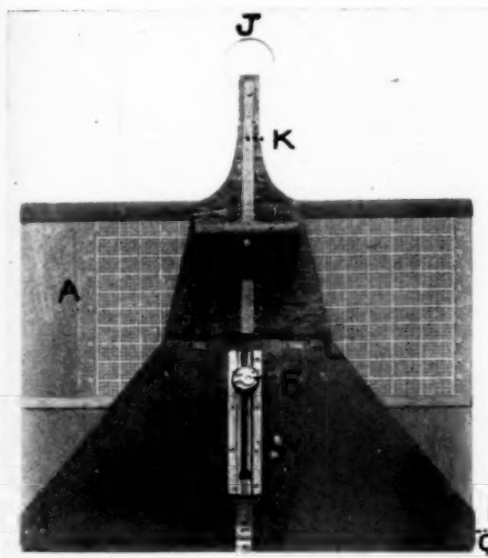


Fig. 1 (Evans). The campimeter folded. table instrument (which is the best method of using it), when the patient is confined in bed, or as a hand instrument (which is the least desirable method of use). It may be folded up for storage or transportation. In simple terms we may say that it duplicates the

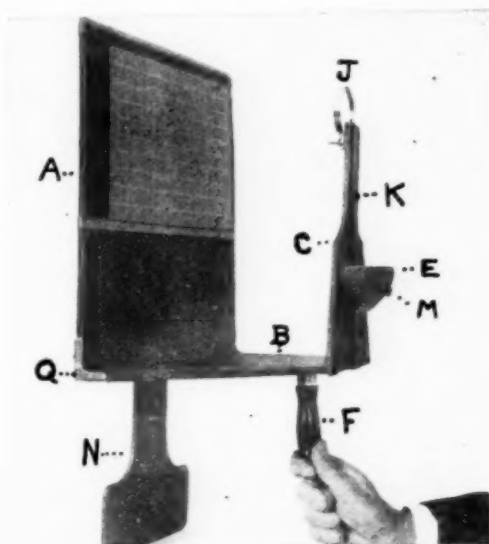


Fig. 2 (Evans). The campimeter as arranged for the patient confined to bed. The base rest may be removed and the device held by the handle; a poor method.

inexpert mechanic for construction of the instrument. The cost of the materials should be less than five dollars. Simpler forms of the campimeter will suggest themselves, but the measurements herein set forth will supply the basis for variations. The materials used are quarter-inch hard ply-wood and spring brass. Standard hinges are used.

Explanation of figures:

A. Slate back to hold a Lloyd slate-chart.

B. Base; may be made of slightly heavier material.

C. Fixation stand; surface toward the patient.

D. Fixation stand; edge view.

E. Chin rest; slides up and down on bevelled molding K. The rest has a right and left hollow to correspond to

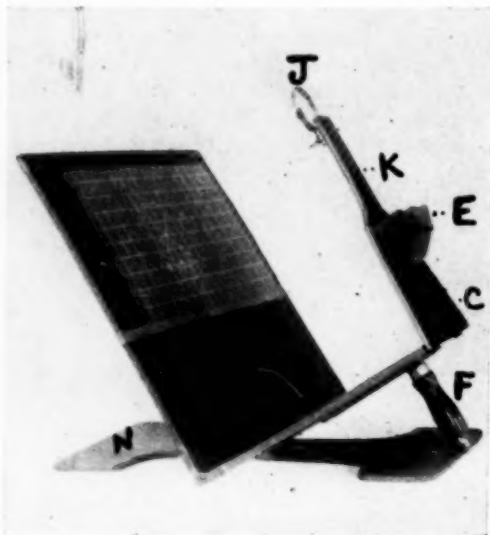


Fig. 3 (Evans). The campimeter angled for use on the table; the handle may be removed if necessary.

the position when right or left eye is centered for lens. The rest is a solid block, shaped gracefully. It measures 4" x 1½". It is locked in position by pressure of bolt M.

F. Handle; also used as prop when the campimeter is used as a table instrument.

G. Fixation stand; surface toward the chart.

H. One-half inch opening, through center of A, behind which a piece of paper containing a quarter-inch grease spot may be placed. This is to act as a photometer when measuring the intensity of illumination used on the chart.

(Note: A standard candle placed two inches behind the hole will cause the grease spot to show brightly. If on the chart side, light of such intensity be provided as will cause the grease spot to become invisible, we have set a satisfactory and reproducible standard illumination. It should be uniformly distributed over the surface of the chart.)

J. The lens, a +5.25 spherical orthogon 49 mm. in diameter, is to be ground by the optician and mounted in a one-quarter inch wide dull bakelite rim. A small hole drilled through this rim and through the upper end of C, one-quarter inch from its top, receives a small brass bolt to hold the lens in position.

K. A one-quarter inch wide strip, bevelled edge base out, engaging female wedge-shaped groove in chin rest E.

M. Thumb bolt to lock chin rest E by pressure on strip K.

N. Base rest to be used in the horizontal position when the campimeter is employed as a table instrument and in the vertical position when the campimeter is used for bedridden patients.

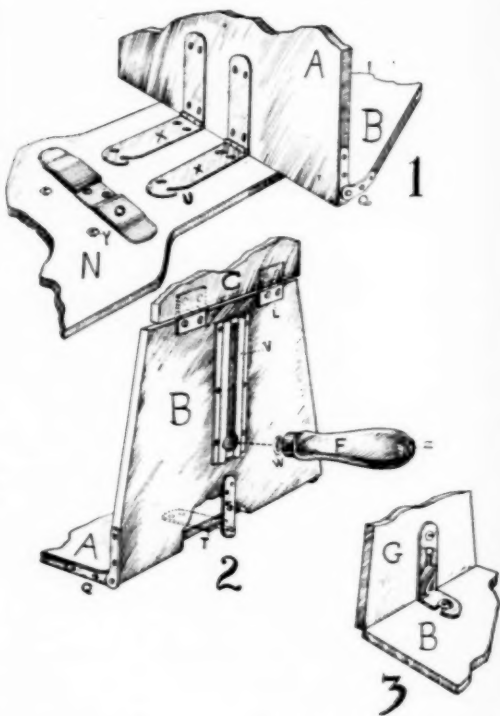


Fig. 4 (Evans). Detailed drawings of small parts.

O. A spring-brass strap to receive the arms of the strap hinges X and X when base rest N is in use.

P. Opening to allow movement of spring S.

Q. Side hinge to allow folding of A on B.

R. Angle brass bracket to lock G in upright position on B. When campimeter is in use it pivots on the screw in G, and the notch as indicated slips under the screw head in B.

S. Spring brass strap screwed securely to B and having in its opposite end a hole to slip over peg-shaped end of T.

T. Brass strap screwed securely to A and having on its free end a peg which will fold into S. These straps S and T are one-half inch wide and are shaped and placed as indicated.

U. A notch filed into one of the screw-holes at the end of the standard strap hinge X. When the base rest N is to be used the free ends X and X are passed under the spring O, and by a sidewise movement the notch U engages under the screw-heads Y, thus locking the base rest securely.

V. This is a standard brass groove which is ordinarily used as a track for sliding panels. A slot is cut in its bottom as indicated and a hole at the end toward the slate-back A. The screw-head W of the bolt through the handle F is introduced into the hole and slid up the groove. By a twist of the handle F the screw bolt W is made to grip the groove of V; a simple slot and hole cut through B would function as well, but it might weaken the base.

W. The head of the brass bolt which passes through the handle F should be of the bevelled type. A flat place is to be filed on opposite sides in the bevel one-sixteenth of an inch below the head surface. This is worked down to such a size that when the head is introduced through the hole in V, the flat places will allow it to slide into the groove of V so that the unfiled portion of the screw-head will slide behind the sides of the groove and allow a turning motion of the handle to lock it.

X. Standard strap hinges screwed securely to A so as to slide under the ends of spring U.

Z. The bolt W passes through the handle F at the lower end of which a recess is made to accommodate a nut. The nut is secured in this countersink by two small screws, thus providing a

thread which becomes an integral part of the handle and will draw down on the bolt when the handle is rotated. This grips the slotted strip V between

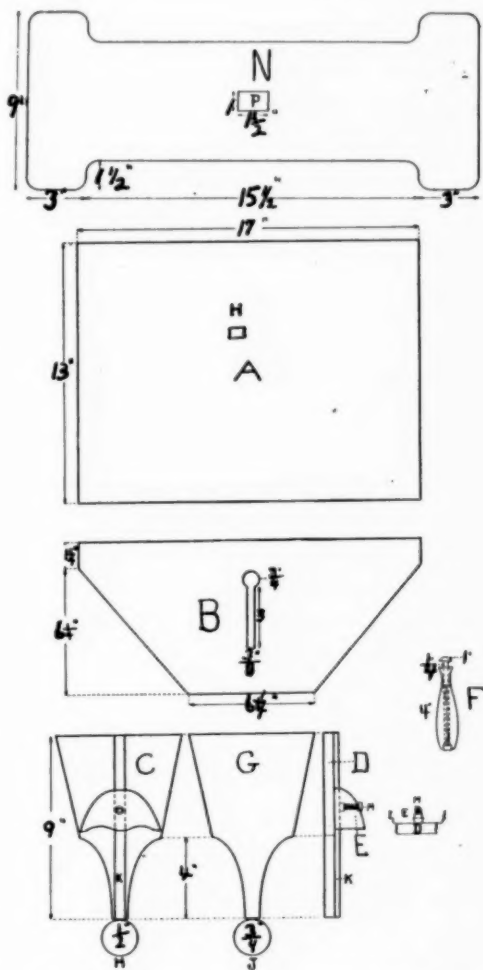


Fig. 5 (Evans). Plan of parts with measurements (see text).

the screw-head W and the upper end of the handle F.

The stereocampimeter charts are held in place by large half-inch rubber bands. The black chart is set with its upper edge even with the edge of the slate back A. The arrow on the border of the black sheet is to be placed downward. When the right eye field is being mapped, the fixation point in the center of the eight-sided figure is to be slid over to the right so that it comes

opposite that eye. It must be slid to the left for examination of the left eye.

The objects to be used in plotting the scotomata have been described elsewhere, and a number of papers have

appeared dealing with interpretations of the defects and with theoretical aspects. The appended references may be consulted.

23 Schermerhorn street.

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METASTATIC ABSCESS OF IRIS AND CILIARY BODY

With case report

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A metastatic abscess of the iris and ciliary body originated from an abscess beneath the lower jaw, which contained staphylococci but had almost healed at the time when the eye became involved. The patient was diabetic. A year later he had a perinephritic abscess, perhaps also embolic. From the department of ophthalmology, University of California Medical School. Read before the Pacific Coast Oto-Ophthalmological Society, September 5, 1930.

By metastasis we mean the transmission of germs, toxins, or cells by the blood stream, the lymph, or both. Metastatic ophthalmia or endophthalmitis is defined by Fuchs as an infection wherein pathologic germs enter the blood stream and are carried by it into the vessels of the eye where they lodge and set up inflammation either there or in adjacent tissue.

Virchow in 1856 first recognized endogenous infection through the agency of embolism, while Michel (1854) and Müller (1857) first studied metastatic suppurative choroiditis.

None of the ocular tissues with the exception of the lens is immune from embolic infection, though fortunately the incidence is not common. According to Fuchs the retina is most often affected. The choroid, ciliary body, iris, optic nerve, vitreous, orbit, and even the eye muscles may be the site of suppurative foci. Keratitis, conjunctivitis, episcleritis, scleritis, tenonitis, and dacryoadenitis have also been reported.

While endogenous infection with pyogenic organisms usually produces a purulent inflammation (frequently panophthalmitis), exceptions occur in so far as the infection may be light in character, being limited, for example, to individual foci in the retina or choroid which heal. Selenowsky states that organisms which if injected into the eye produce suppuration may produce only a chronic plastic inflammation when entering the eye through the blood stream. He quotes as examples the endogenous infections of nasal, dental, or tonsillar origin and certain cases of influenza, cerebrospinal fever, and relapsing fever.

A wide variety of causative organisms has been recorded. The commonest organisms are streptococci, meningococci, gonococci, pneumococci, staphylococci, influenza bacilli, and typhoid bacilli. Morax¹ has called attention to certain characteristics in the clinical picture of staphylococcal infections. According to his observations, this organism causes relatively circumscribed

intraocular or periocular abscesses which may burst externally or be absorbed in situ. These show less tendency to spread to other intraocular structures, have a milder onset, and progress more slowly than streptococcal or pneumococcal lesions.

The source of infection is likewise varied, since these organisms produce such a diverse range of pathological processes. In addition to frank cases of pyemia, bacteremia, bacterial endocarditis, pneumonia, or typhoid fever, diseases of lesser magnitude may give rise to embolic processes. Furuncles, whitlows, mumps, arthritis, caries of bone, enteritis, lymphadenitis, and cholecystitis are reported causes. In children, suppuration of the umbilical cord and sometimes vaccination may give rise to pyemia and metastatic ophthalmia. The primary infection may vary from a rapidly fatal puerperal septicemia to an insignificant scratch or weather crack of the skin of the extremities. Then, again, a residual chronic disease such as tuberculosis or leprosy may be the etiology. Greeves² reported a case of metastatic choriorretinitis resulting from an abscess of an upper bicuspid tooth. The tooth was extracted and the patient was given injections of stock staphylococcus vaccine; later an autogenous vaccine was prepared from staphylococci obtained from a suppurating chalazion. Vision gradually improved until a final 6/6 was obtained. Sidler-Huguenin³ reported twelve cases of metastatic gonorrheal ophthalmia. Nine of these were cases of monocular metastatic iridocyclitis and three were bilateral metastatic conjunctivitis. In five out of the twelve cases gonococci were found in the blood.

Errors of diagnosis may be made. Fuchs⁴ mentions the case of a girl aged three who developed an inflammation in one eye following an attack of grippe. She was treated for several months under the diagnosis of metastatic ophthalmia. The eye was eventually removed and section showed a glioma of the optic nerve.

According to Small⁵ metastasis re-

sulting from pyemic infection occurs in the following sequence: first, the absorption of inflammatory agents, frequently from a trifling lesion such as a furuncle or scratch, next the formation of a thrombosis at the point of absorption and the colonization of pyogenic bacteria therein. From this thrombus minute portions laden with cocci break away, enter the blood stream, and are carried to important organs. Here secondary thrombi and emboli form and the eye at length becomes affected with colonies of bacteria.

Stephenson⁶ believed that the ciliary processes had a rôle in endogenous infection. He pointed out that the ciliary processes represented simple filtration apparatus. Parsons⁷ has compared this arrangement to the glomeruli of the kidney. The ciliary processes, possibly modified by a virus in the circulating blood, attempt to filter out the extraneous substance, be it microorganisms or bacterial or cellular toxins. The toxic substances are thus poured into the anterior and posterior chambers of the eye where they bring about inflammatory reaction in the iris and surrounding structures. In favor of this theory, he quotes references where *treponema pallidum* has been found in the aqueous taken from an eye with acute syphilitic iritis. Tubercle bacilli have been similarly found in the aqueous of cases of tuberculous iritis. Organisms were also found in the aqueous in cases of typhoid fever and erysipelas, and in the polymorphonuclear leucocytes of the aqueous in rabbits injected intravenously with *micrococcus rheumaticus*. Irons and Brown⁸, in their work on experimental iritis, have found that the eyes of rabbits can be sensitized by intraocular injections of minute amounts of dead bacilli, so that after the eyes are again quiet an intravenous injection of living bacteria will set up inflammation more often in these sensitized eyes than in control eyes. They believe that this may have some bearing in patients harboring persistent foci of infection, and in cases of recurrent iritis.

To trace the course of a metastasis

from a furuncle of the extremities to the ciliary body of an eye is an academic exercise of considerable magnitude. Many instances of curious metastasis by cells as well as by bacteria are recorded. Doesschate⁹ reported the case of a woman who had a melanoma of the breast. Metastasis is stated to have occurred from the breast to the left eye and from the left eye to the right eye. Metastasis from the eye to other organs is typified by Velhagen's¹⁰ case of a sarcoma of the eye which metastasized to the liver.

As to the pathology, Fuchs¹¹ has described in his Pathological Atlas findings in a woman of twenty-four years who developed metastatic endophthalmitis following abortion. Due to the extreme toxicity of the organism, a streptococcus, there was rapid disintegration of the retina in certain areas while the retina adjacent was scarcely

affected. Emboli occurred in the root of the iris where some of the vessels were occluded by blue-staining cocci. The iris adjacent was not inflamed owing to lack of time, death occurring two days after symptoms developed. For the same reason only a few flakes of pus (incipient hypopyon) were seen on the posterior layers of the cornea. Fuchs stresses the early development of secondary glaucoma where the root of the iris is thickened with infiltrate.

The following case is reported because it is unusual, because it was not properly diagnosed, and because of the complicated general and clinical picture.

Case report: H. W., male, aged fifty-two years, was admitted to San Francisco Hospital, service of Dr. H. Clare Shepardson, November 14, 1928; the diagnoses were abscess of the left inframandibular region and diabetes mel-



Fig. 1 (Horner and Cordes). Iris and ciliary body showing purulent exudate. (Low power.)



Fig. 2 (Horner and Cordes). Iris showing embolic abscess.
(High power.)

litus with acidosis. His family history showed that his mother and one brother had had diabetes. His past history had been uneventful save that he had been diabetic for the past five years. Two weeks before entry, he had noted a small tender nodule under the angle of his jaw. This had grown in size and had become increasingly painful until he consulted his family physician who recommended his entrance to the hospital.

At entrance, he was stuporous, showed considerable loss of weight, had a high blood sugar (450 mg. per 100 c.c.), much glycosuria with acetone and diacetic acid, a temperature of 102 degrees and a leucocytosis of 12,700 with eighty-eight per cent polymorphonuclears. The abscess was tender and fluctuant and measured about 8 by 10 cm.

The following day the abscess was

drained by an incision along the angle of the jaw. Cultures of the pus showed staphylococcus aureus and *B. subtilis*. Improvement was rapid under general diabetic care and insulin, and by the third day his maximum temperature had fallen to 99 degrees. The urine was sugar-free and blood sugar estimations had fallen to 117 mg.

On November 24, ten days after entry, he developed a reddened and painful left eye, and we saw him in consultation. By this time, the neck abscess was almost well, only a small amount of discharge remaining. Examination at this time disclosed a normal right eye. The left eye showed paralysis of the external rectus muscle, ciliary injection, a hazy iris which was off color, and a small inactive pupil. The tension was normal. The fundus was not visible owing to a cataractous lens. A diagnosis of acute iritis was

made, treatment ordered, and investigations as to the probable source of both the iritis and the paralyzed external rectus were started.

The Wassermann was negative and he appeared free from the ordinary focal infections. The spinal fluid was normal. Neurological examination showed nothing to account for the muscle palsy. In the absence of other

bacilli, was given because of the poor condition of the patient. Five million more were given subcutaneously. A good reaction ensued, the temperature reaching 103.4 degrees. The tension next day seemed slightly less but it was still plus. There was no general improvement.

The clinical notes of December 6th, twelve days after onset, are as follows:

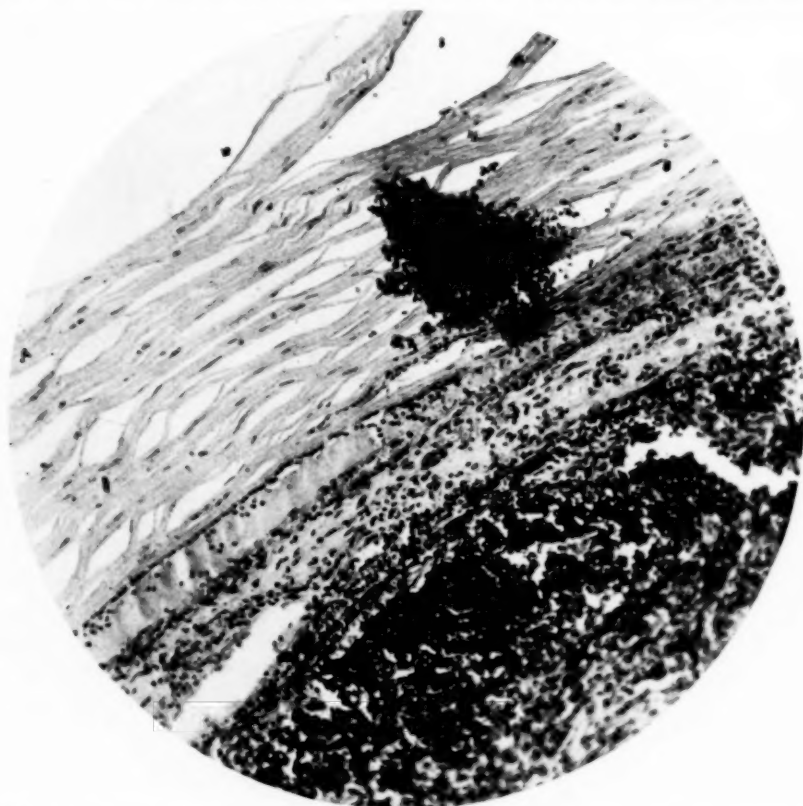


Fig. 3 (Horner and Cordes). Angle of anterior chamber. (High power.)

etiology it was assumed that the iritis was secondary to diabetes.

An eye examination three days later showed the left eye considerably more injected. The tension was one plus. A localized swelling in the iris was seen; it was nasal to the pupil but did not involve the pupillary area. There was no hypopyon. The swelling suggested a cyst. Because of the increase in the severity of symptoms typhoid vaccine intravenously was ordered. Only a small dose, 10 million

"The area in the iris has grown larger. The color is dark now. There have been recurrent hemorrhages into the anterior chamber together with increased exudate in the pupil. The eye remains hard. The iris tumor suggests cyst, tuberculosis, lues, or malignancy. Lues may be pretty well ruled out by the negative Wassermanns in blood and spinal fluid. Cyst does not seem likely. Tuberculosis is possible although he has no systemic tuberculosis. A solitary tubercle therefore can-

not be ruled out. Malignancy is suggested and cannot be ruled out. Hence, since this eye is already blind, is painful and glaucomatous, and harbors an acute process of dangerous aspect, enucleation is advised."

The eye was enucleated under gas anesthesia on December 10th, fourteen days after onset. The patient was discharged from the hospital two days later.

The pathological report of Dr. G. Y. Rusk is as follows: "Microscopic examination of sections from the anterior portion of the eye shows the cornea negative. At the sclerocorneal juncture the vessels of the conjunctiva are injected, the tissues are edematous, and there is a moderate mononuclear infiltration of inflammatory cells. The anterior chamber contains serum in which are a few scattered leucocytes. The iris in its mid portion is edematous and at either end there is a purulent exudate on the inner side of the iris, the exudate extending over the ciliary body. This exudate is relatively scanty on one side. On the other side it forms a large mass composed of leucocytes,

and undifferentiated mononuclear cells internally, which on the inner surface of the ciliary body appears organically attached. Endothelial cells and occasional fibroblastic cells appear to be growing out from the exudate and organizing it.

Diagnosis: Purulent exudate with beginning organization on inner surface of ciliary body."

Comment: This case of metastatic abscess of the iris and ciliary body originated from an abscess of the neck which bore staphylococci, but was almost well at the time of eye involvement. It began as an acute iritis, a disease not uncommon in diabetes. Further complications in the clinical picture were cataract, secondary glaucoma, an iris tumor, and a paralysis of the external rectus muscle. A further interesting, though much later, development in this patient was a perinephritic abscess which occurred about one year subsequent to the date of the above record, constituting another embolic phenomenon.

384 Post street.

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LID EPITHELIOMA; EXCISION

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This fairly large lid epithelioma was treated by excision, the skin defect being corrected by means of sliding flaps.

Case 4. B. S. S., sixty-four years of age, came to the clinic on May 19, 1928. History: for the last twenty years she had had a wart, about the size of a small pea, on the left lower eyelid; for

and one on the chin; each was about the size of a small pea. Vision, right eye, 20/30, with a plus 1, 20/20; left eye, 20/30, with plus 1, 20/20. Add plus 3 equals J. 1 with either eye.



Fig. 1 (Castroviejo). The patient before operation, and after healing.

many years it had remained about the same size. Two years ago it began growing; it actually interfered with her vision because it was in front of the eye and prevented the closing of the eyelids.

Examination. On the lower left lid close to the lateral canthus was a growth, pinkish in color, with broad pedicle, 3 by 2 cm. (figure 1) easily movable and not adherent.

The growth presented slight vascularization but the skin was not ulcerated. The eyeball was slightly congested due to the inability of the patient to close the eye. Four other warts were found; one was on the upper lid of the left eye, two on the left cheek

Clinical diagnosis: Epithelioma, hyperopia and presbyopia.

Operation was advised. The operation was performed under local anesthesia. The tumor was dissected out and with it enough of the surrounding skin to discourage a recurrence. The flap was triangular in shape as represented in figure 2A; the eyelashes were left in place. Another flap, as represented in figure 2B, was undermined and slipped upwards to cover the area of the first loss of substance. After this, another triangular flap of substance was lifted to cover it, the vertical incision was prolonged about 3 cm. and the skin loosened from the subcutaneous tissues as indicated by the dotted line in figure 2C.

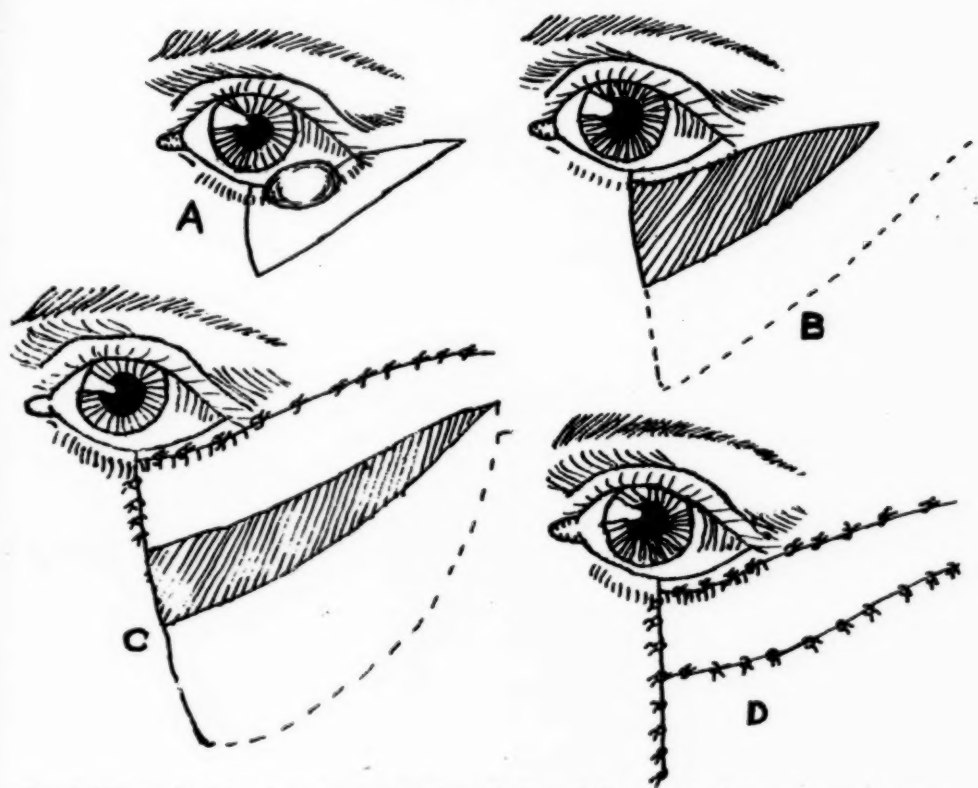


Fig. 2 (Castroviejo). A, primary incision, B, C, and D, steps in formation and suturing of skin flap.

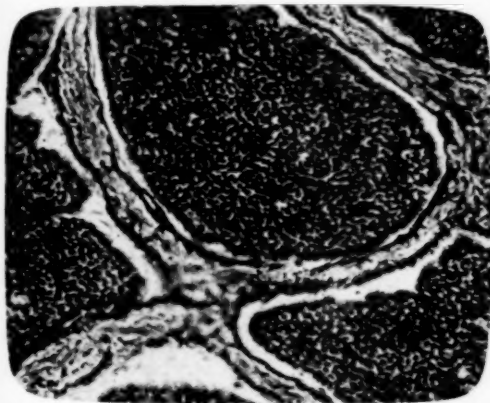


Fig. 3 (Castroviejo). Microscopic appearance of tumor.

Then this flap was slipped upward and fixed by sutures (figure 2D); yellow oxide of mercury was applied and the eyelids were sutured together. Tull grass, an oily gauze made in France and used in plastic surgery in order to avoid adhesion of the bandage to the tissue, was applied over the eyelids.

The bandage was changed daily and was removed after two days; the incision suture was removed in about ten days, and the suture of the lids in about fourteen days.

The postoperative result can be seen in figure 1. The microscopic appearance of the tumor, seen in figure 3, shows a basal-cell epithelioma.

231 West Washington street.

MONOCULAR TESTING OF THE COLOR-BLIND

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Unilateral color-blindness, or a distinct difference as to color vision between the two eyes, is rather infrequently mentioned in the literature, and apparently it is the general custom to test both eyes together for color vision. One case of monocular color-blindness was discovered by the authors in the testing of twenty-three persons. The Ishihara plates for testing color vision are particularly valuable, and give lower ratings than the Stilling plates because the former contain hidden numbers. From the psychology laboratories of Stanford University.

Notwithstanding the universal custom of examining the eyes separately, tests for color-blindness are ordinarily administered with full opportunity for binocular vision. There are several things that have probably contributed to this state of affairs. Color-blindness has not been regarded as a defect to be treated in a qualitative or quantitative manner, and the examiner does not trouble to make an analytic determination about a condition for which he can do nothing. In the second place, if the examinee has full color vision in either eye, this has generally been regarded as adequate equipment for making the color discriminations of everyday life and of industry. Lastly, it has generally been assumed that the two eyes have the same degree of color sensitivity or of color defect. For one or all of these reasons color-blindness has not received the type of attention given for example to the color fields.

The first view-point that we have mentioned is a practical matter and as such probably indicates that there is no reason to make the color-blindness examination more elaborate than necessary. But the assumption that both eyes are equally color-blind or equally color-seeing, while it may agree with the usual test results, is not sufficient warrant for determining the mode of examination in this matter, particularly if we regard it as a subject for scientific inquiry. The matching of yarns or the sorting of solid colors was laborious, both for examinee and examiner. But the use of confusion figures, particularly as so admirably represented in the Ishihara plates¹, for preliminary color-blindness examinations

is exceedingly simple and requires as brief an expenditure of time as any form of examination with which we are acquainted.

From the standpoint of examining the individual it is characteristic that a person finds more interest in testing a part of himself against another part than he does in being tested against some hypothetical average or normal man. As an illustration individuals are very glad to test the strength of right hand against that of left hand. This type of self-analysis has a good deal to recommend it. In the Ishihara test, especially in those plates (numbers 2, 3, 4, 5, 12, and 13) which contain the hidden figures, or two figures of different chroma on the same background, the subject trying the eyes, one after the other, finds it of much interest to note if one eye can see something which the other eye fails to see.

In this communication we report experiments of a preliminary sort on twenty-three color-blind persons that had been located in a previous test carried out in connection with a physical examination². This represents our first trial in monocular testing of color-blind individuals. We divided the plates of the Ishihara series, numbers 2 to 13, into two matched groups, and similarly we divided the plates of the Stilling series into two groups. Then we combined Ishihara group A with Stilling group A, making one group, and similarly combined Ishihara group B with Stilling group B, making a second group of twenty. Plate for plate the two groups called for the same color discriminations.

These plates were exposed one at a

time to the subjects, who were tested individually and under conditions of controlled illumination. The work was done in a dark room. The lighting was from a daylight color-matching unit such as is employed in department stores for matching colored fabrics. This unit was fitted with a 200-watt Mazda lamp and by means of a rheostat the candle power illuminating each simultaneous contrast plate, when viewed by the subject, was regulated to forty candles per square meter of surface.

Each subject stood at a four-foot distance from the board on which the simultaneous contrast plates were displayed. Pairs of goggles with glasses removed and with one side covered served as blindfolds. Blindfold A, permitting monocular vision of the left eye, was put on before any plates were shown. The plates were presented in random order and a record was made of the subject's reading response for each plate. After the twenty plates of series A had been given (exposed to the left eye) that eye was blindfolded and series B, twenty plates, was presented to the right eye. These were also given in random order. It will be noted that every one of the plates in series B corresponded with one in series A so far as color contrast combination was concerned, although different numerals were displayed in the paired plates. There was thus no duplication in plates. Each eye saw different numerals, hence the matter of memory played no rôle in the comparison of the two eyes.

When the monocular testing at the four-foot distance had been completed, each subject was asked to stand at an eight-foot distance and series A was repeated for binocular observation. Following this, series B was repeated for binocular observation at a distance of twenty feet. This concluded the first part of the color-blindness examination.

Results of monocular testing

For purposes of comparing the two eyes on these directly comparable series of charts we chose an arbitrary method of scoring. Considering each chart as

a unit the following point rating was adopted: if a chart was correctly read, zero was entered; if a chart was read as is usual for the color-blind, one point; if it was read in a miscellaneous fashion, numbers being called out but these not corresponding to the correct numbers or to the usual numbers seen by the color-blind, a score of two was given; finally, if no numbers could be seen on the chart, a score of three was given. We make no particular defense for this method and recognize that it does not give a normal distribution for the different plates. For example, in certain of the Ishihara plates where there is a hidden number the score of one will be very frequent, whereas in the Stilling plates, where there are no hidden numbers, individuals will more frequently be found who will rate three. The fact that the two series of plates are as nearly equated as has been possible for the lithographer to produce makes this method of scoring usable.

It will be clear that, since there were twenty plates, if a person were absolutely color-blind and failed entirely to see numbers on any of the plates, he would get a score of sixty. No individual of the twenty-three tested had such a high score for either eye. One individual was found who had a marked degree of color-blindness in the left eye and normal color sensitivity in the right. The two scores in this case were thirty-seven and one respectively. The results for the other twenty-two subjects are presented in table 1. In section 1 of this table, which relates to the use of the complete series A and B described above, it will be seen that the total scores range from twelve to forty-two. In most cases the scores for the two eyes are almost the same and in five cases (numbers 1, 4, 8, 15, and 16) they are exactly the same. On the other hand there are three cases (numbers 6, 11, and 20) where the difference between the two eyes amounts to more than five points of score. It may be a coincidence that in each of these three cases the more color-blind eye is the left one. When we compare the exact scores we find that there are nine cases

that show a higher or slightly higher score with the left eye than with the right, and eight cases that show a higher score with the right eye than with the left.

If we take the means for the two eyes we find that these values are nearly the same but slightly larger for the left eye, 27.7 compared with 26.6. The table shows the standard deviation for each of these means and, as might be expected, indicates a fairly large variability between the subjects examined.

Table 1

(Color-blindness scores on twenty-two men for right and left eye tested separately. The larger the score the poorer the color vision.)

Case no.	1. Ishihara and Stilling		2. Ishihara	
	L. eye	R. eye	L. eye	R. eye
1	35	35	13	13
2	39	35	15	11
3	20	24	7	5
4	21	21	10	5
5	20	18	5	5
6	42	33	14	11
7	23	22	7	6
8	35	35	11	14
9	37	41	13	17
10	25	27	7	8
11	27	13	12	7
12	35	33	11	14
13	23	24	6	8
14	19	17	8	3
15	32	32	14	12
16	22	22	7	3
17	31	27	10	7
18	12	13	3	3
19	35	39	15	17
20	25	18	8	7
21	31	35	9	12
22	20	22	1	10
Average	27.7	26.6	9.4	9.0
S.D.	7.7	8.2	3.8	4.3

In the part 2 of table 1 we have given the results for the Ishihara plates only. The maximum score possible in this portion was eighteen, and there are two instances where this was nearly realized. Case number 11 is shown to have a considerable difference between the left and right eyes on the basis of this portion of the test. The differences between the two eyes as shown in part 2 do not closely agree with those indicated in part 1, when considered case

for case. However it turns out that the left eye has a slightly higher mean, 9.4 compared with 9.0. The Pearson *r*, correlation for left eye with right eye in the combined series of the Ishihara and Stilling plates appears as 0.85 ± 0.04 . The correlation in the score for left eye with right eye on the Ishihara plates only, as shown in the second part of the table, is 0.63 ± 0.08 . The correlations would have been somewhat lowered had we included the one case that was shown to be color-blind in one eye and to have normal sight in the other eye. What we have expressed in these correlation coefficients is the relationship that may be said to usually exist between the state of color-blindness of the two eyes in individuals who have something of a color defect in each.

We are not satisfied with this particular form of monocular color-blindness testing but believe our results are indicative that there is a fruitful field for scientific inquiry through some such analytical examination of these cases. To discover a case of monocular color-blindness or one that demonstrates distinctly graver color-blindness in one eye than in the other has seemed to us very much worth while. It is not impossible that careful scrutiny and prolonged observation of such cases will yield important results bearing on color theory. Certainly such individuals, if they are disposed to observe and experiment with color equations and matchings in experiences of all sorts, have within themselves the conditions which may make their prolonged observations of critical value.

Unilateral color-blindness, or distinct difference between the two eyes, is rather rarely mentioned in the literature. We have no information as to how frequent this condition actually is. Possibly it amounts to three or four percent of the color-blind. It happened that we discovered one such case among twenty-three reported in this paper. In another study³ on approximately thirty cases of color defect identified in a total group of some 390 mercantile salesmen, one unilateral case was discovered. This individual was a

dry-goods salesman and aware of his condition. He reported that it presented no great problem to him because "each time I am required to match fabrics I merely close the bad eye and make the proper discrimination with the good one." In place of duplicating tests for determining the percentage of incidents of color defect in normal populations of men it might be well to devote attention to ascertaining the number and identity of unilateral cases, making studies of these and bringing such cases to the attention of ophthalmologists and other scientific men who are working on problems of vision and eye condition.

One other group of observations we wish to report very briefly. This consisted in using a Munsell photometer with a fifty-watt daylight lamp placed in front of each of its two windows. The window at the left was covered with a piece of thin paper so that the point at which the same degree of brightness was observed in both windows would not coincide with the zero point of the indicator scale. Equal brightness of the two windows appeared when the indicator was set at

sixty-four. Each color-blind subject was asked to look through the photometer with his right eye and to turn the adjusting knob so that the left half of the circle which he saw would appear green to him. After he had made the proper adjustments and the reading had been taken he was asked to do the same thing, adjusting the indicator so that the left half looked red or slightly red to him. It seems significant that of the twenty-two subjects eighteen found a place for the indicator where it seemed to them that the left half was green. Doubtless suggestion played some part in this. Nevertheless it is clear that these subjects are easily confused into thinking that a certain gray or dim light is of a green cast. Seven of the twenty-two subjects found a place that seemed to them red. Four of the twenty-two were unable to find either green or red in the range of adjustment. This type of test, that is, the use of a photometer, or requiring the subject to sort a series of gray papers "into groups according to color", provides interesting confirmation and sheds side lights on the results from other color-blindness tests.

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THE PRESENT TREND OF THOUGHT REGARDING VERNAL CONJUNCTIVITIS

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A summary of the literature on this subject is presented showing the tendency to regard the condition as an expression of some constitutional disorder as of the ductless glands or the vegetative nervous system or an allergic reaction; also giving suggestions as to therapy. Read before the St. Louis Ophthalmic Society October 24, 1930.

There has been little, if any, definite increase in our knowledge of the etiology of vernal conjunctivitis since Axenfeld in 1907 made his frequently quoted report to the French Ophthalmological Society. More recently, Luedde, in his thesis for the American Ophthalmological Society, again summarized our knowledge of this condition. His advocacy of the use of fibrolysin, now used by so many of us, was the *raison d'être* of his paper.

Since Edinger and Hess in 1917 published their well known monograph on vagotonia, a voluminous literature has grown up about it. All branches of medicine have sought an explanation of certain obscure conditions along the path opened by these men. In view of our lack of information regarding the etiology of vernal conjunctivitis, it is but natural that investigators have also sought this line of attack as a possible means of solving this ophthalmological question. On the theory that vernal conjunctivitis is evidence of a vagotonic state and lessened suprarenal activity, Trettenaro used adrenalin together with autoserum in the treatment of his patients. He reports rapid disappearance of the conjunctival condition with these therapeutic measures. Guerra, after a study of a series of cases, came to the conclusion that the vagotonic complex is the predominant factor in the causation of this disease. No allergic phenomena were found in his patients after the use of various pollens, and in no case were any results achieved by either specific or unspecific desensitization. He found reduced arterial pressure and heart action, oculocardiac reflex and increased resistance to grape-sugar. These symptoms are considered characteristic of reduced

adrenalin secretion. The results after subcutaneous injection of adrenalin and pilocarpine also speak for vagotonia. The calcium content of the blood was normal or increased. He thinks it is possible that the vagotonic condition provides a favorable soil for the allergic phenomena, but this has not been experimentally proven. According to this writer, one must assume that the patients with vernal conjunctivitis are vagotonic individuals, and that adrenalin is therefore indicated, but how the clinical signs of the disease develop has not been established. This investigator followed the method of treatment of Tessier, who showed that small doses of adrenalin over a long period are productive of good results when the cases have proven refractory to large dosages given for a short time. All other forms of treatment were of no avail. Whether recurrences can be prevented by this means is still doubtful.

Rizzo, after a study of eleven patients with special reference to constitutional data, and particularly the vegetative system, concluded that weakness of the chromaffin system and insufficiency of hypophysis and thyroid are underlying factors. He found anomalies in physical growth like infantilism, feminine habitus, and degenerative signs in the secondary sex characteristics. In several, status thymico-lymphaticus was demonstrable. All patients showed vagotonia, eosinophilia in the blood and relative lymphocytosis. These patients gave very slight reactions to one milligram of atropine or adrenalin. On the other hand, reactions to pilocarpine were severe. The Dagini-Aschner sign was very positive and dermatographia could be readily demonstrated. One patient had keratoconus. Pulse rate and

blood pressure were unusually low. Gennaro, who saw vernal conjunctivitis and keratoconus in two brothers, also noted female habitus with under-development of external genitalia in both. He regards these men as vagotonic individuals with status thymico-lymphaticus and hypophyseal insufficiency. He believes that both the conditions mentioned rest on this constitutional basis. In this connection a report by La Grange is of interest. Observation of four cases leads him to the belief that vernal conjunctivitis is a manifestation of the exudative diathesis. He found ectopia and diminution in size of testicles, and in one case, phimosis. Another child had an enlarged thyroid. Cutaneous reactions to various pollen extracts were strongly positive. Treatment with testicular extract resulted in prompt improvement. With development of the genitalia the disease disappeared. Another writer, Barbato, also favors the theory that we are dealing with a disturbance of the sympathetic system, while Seefelder and Berger, after studying the subject, conclude that the vagotonic disposition can be regarded as only a link in the etiological chain.

Lemoine found in most cases of vernal and phlyctenular conjunctivitis a change in the equilibrium of internal secretion, especially the thyroid, parathyroid, and generative glands. Various anaphylactic manifestations from the ingestion of certain foods were also noted. He recommends organo-therapy, and when the *causa movens* cannot be removed, immunization every two years, together with organotherapy. Santori mentions that Angelucci and his pupils have pointed out the frequency of vernal conjunctivitis in persons of the lymphatic type with no symptoms of vagotonia. He is an advocate of the use of endothyroidin in conjunction with local measures. Adrenalin preparations with other gland therapy and calcium are advised by Mamoli, who believes that vernal conjunctivitis appears in individuals with vagotonia due to insufficient adrenalin. He does not think that the etiology from the standpoint of photosensitivity,

alimentary anaphylaxis, or pollen sensitization has been established.

Lehrfeld, in a recent publication, shows how difficult it is to attack the problem from the standpoint of allergy, for, as a previous investigator has shown, "one cannot test every case to every possible protein, and there is always the possibility that the patient might be temporarily desensitized." In vernal conjunctivitis we may get a different response to one or more proteins in the early stages as compared with the older cases. Then again a patient may react similarly to several proteins. He suggests that if the minimum and maximum dose of certain reactors be determined it might be possible to desensitize such individuals in the spring with the idea of preventing recurrences. La Grange of Paris advocates most emphatically the idea that sensitization plays a major rôle in the etiology of vernal conjunctivitis. He stresses the fact that conjunctivitis can be the result of sensitization to vegetable and animal albumin; that the ophthalmologic reaction can give the typical picture of vernal conjunctivitis. According to him the so-called neuro-arthritis diathesis may produce this disease, and there is a relationship between vernal conjunctivitis and the anaphylactic diseases, just as between asthma and hay fever. In this connection it is pertinent to report that Gonzales found eosinophilia in the conjunctival secretion of sixty percent of his patients. The curve rises from March to mid-summer and drops in September. He is not the first to point out the value of eosinophilia in the conjunctival secretion as an aid in making a diagnosis. Dinulescu and Nestianu stress the importance of this fact together with the presence of numerous eosinophilic granulations with follicle formation and diffuse lymphatic infiltration as a means of differential diagnosis between vernal conjunctivitis and trachoma.

Axenfeld pointed out the possibility of finding vernal conjunctivitis in conjunction with a skin condition. Junius, in a recent publication, again brings up

this association and suggests that possibly photosensitivity may explain both conditions. We know that certain substances render cells sensitive to light and that these have the property of fluorescence. Hematoporphyrin is one of these and he believes that it or some allied material, when present to excess, may be an important factor in the etiology of vernal conjunctivitis. Verdaguer noted that Hebra's prurigo was found in most such cases. This involved mostly the face and upper limbs, with special localization about the mouth. This combination according to this writer, has been found in about fifty percent of all cases, and we must think of a common etiology. Blood examination of patients showing both conditions gave pronounced leucocytosis with about ten percent eosinophiles. The regularity of eosinophilia in the excretions and proliferations of the conjunctiva and in the blood of the patients in conjunction with the leucocytosis and glandular enlargement brings to mind the picture of pseudoleucemia. From this data it will be seen that the question of etiology in vernal conjunctivitis is still a fertile field for the investigator. Whether endocrinology, the sympathetic nervous system or allergy will give us the desired information remains to be seen.

The outstanding feature in the study of vernal conjunctivitis in our generation has been the development of radium as a therapeutic measure. In recent years Laura Lane, Cordes and Horner, Derby, and Robinson in this country, and Riggins, Soria Escudero, Rolandi, Castresana and Waardenburg abroad have helped develop a technique which has reduced materially the dangers attending its use. Hume and Duke-Elder have used ultraviolet light but find results with it much less satisfactory than when radium is used. In this connection La Croix reports that marked improvement was observed in the ocular condition of a twelve year old boy who had been treated with ultraviolet light because of his poor general health. Autohemotherapy which

has been recommended in the treatment of various eye conditions has also been used in vernal conjunctivitis. Cassimatis, working in Egypt where the disease is active the year round, saw rapid lessening of symptoms and reduction of objective signs following injections of the patient's own blood. Equally good results have been recorded by Salvati. In addition to these measures Strebel and Veil advocate treatment with carbonic acid snow, and Tostscheff is enthusiastic about the use of lactic acid. According to the last named writer, the local use of this drug has given results superior to anything in the literature.

This study of the recent literature of vernal conjunctivitis shows that an effort has been made to explain the disease on the theory that the vegetative nervous system of such afflicted individuals is at fault. As we read these various reports we feel more and more that the relationship of so-called vagotonia and the endocrine glands is such an intimate one that we cannot consider one without the other. The same is true of allergy. Any piece of investigation, to be of value, will have to take cognizance of all three factors. The published results of recent investigations are conflicting and do not permit of our coming to any definite conclusion. The suggestion of Junius that photosensitivity may prove an important factor in getting at the etiology of vernal conjunctivitis merits attention. Whoever attempts this piece of investigation will have to do a great deal of work in hematology as the sensitizing material probably comes from the blood stream. In view of our present lack of knowledge concerning the etiology of this condition, one will hesitate to use therapeutic measures whose efficacy is still unproven. Treatment with radium has given such satisfactory results in the past that for the present at least it will undoubtedly continue to be our favorite weapon against the discomfort produced by this disease.

Missouri Theatre building.

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SOCIAL SERVICE AT THE MASSACHUSETTS EYE AND EAR INFIRMARY

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BOSTON

The eye social service in the Massachusetts Eye and Ear Infirmary is discussed, showing increased efficiency in handling such diseases as ophthalmia neonatorum, phlyctenular disease, ocular tuberculosis, interstitial keratitis and glaucoma by studying the patients' surroundings and by cooperation with other social agencies. Read before the New York Academy of Medicine, November 17, 1930.

I have chosen for my title, "Social Service at the Massachusetts Eye and Ear Infirmary", for the reason that I believe eye social service first started there, and owing to its twenty-one years of existence it has, as far as my knowledge goes, developed farther there than in any other hospital in this country. I know my own hospital before the advent of social service, I know eye clinics throughout the country where social service is non-existent or of a primitive nature, and I would like to go on record now as saying, that I believe a properly developed social service department in an eye hospital adds very largely to that hospital's efficiency, in fact, is indispensable. I was going to say that it added fifty percent but perhaps that is an overstatement when all classes of cases are taken into consideration. Certainly it adds fifty percent to efficiency in certain groups of cases.

In 1905 Richard Cabot started medical social service at the Massachusetts General Hospital. In 1909 a quiet, unassuming young woman named Catherine Brannick appeared in a sort of nurse's uniform at the clinic of our Infirmary. She had been placed there by some far-seeing people who were interested in the prevention of blindness, and I want to say right here in support of the correctness of their views, that if I had \$1,800 or \$2,000 per year given me with instructions to use it to the best advantage to prevent blindness, I would engage a competent social worker and put her in an eye clinic. None of us knew for what this young woman was there; she kept her own counsel and learned the running of the clinic before she began to make herself useful by seeing that some of the more

resistant cases got the treatment ordered for them, and that those badly in need of continual treatment returned to the clinic. Furthermore, she became the connecting link between the hospital and the various charitable and social agencies outside. After a time there came to a few of the staff a glimmer that here was a service useful to the doctor, as well as to the patient.

Beginning with the single worker, a department slowly developed, confining its attention largely to personal contact with patients and their families, follow-up work, and liaison with outside agencies, through which often financial help could be furnished. These duties, it seems to me, are the fundamental ones which every social department must develop before going farther afield.

Around 1910 came the drive in Massachusetts to reduce the ravages of ophthalmia neonatorum, and our social service was ready to step in and do its first piece of intensive social work on a special group of cases. Our contagious ward, given to us in 1901, was not designed to admit babies and mothers, our general medical liaison service was not properly developed, so we all turned our energies to the task of providing better care for these unfortunate infants, and to considering the disease as a public health problem, as well as a medical one. In this, social service was of great assistance. It made the contacts which provided us with sufficient breast milk for these babies. It went into the homes to educate the parents and to bring them into the hospital for examination and treatment of any venereal disease. It assisted greatly in oiling the machinery which investigated the responsibility for infection of the

child, and placing the responsibility where it belonged. I remember well one discouraging case, where the mother had been delivered by a doctor who was the health officer of that town. He knew the baby had infected eyes, so he reported the case to himself and then went fishing for a week, during which time one of the baby's eyes was destroyed and the other was barely saved, and we could do nothing about it. In twenty-one years of service we have worked with 2,238 babies with ophthalmia neonatorum in our isolation building. A few figures as to the incidence of ophthalmia of the newborn may be of interest. The number has diminished from 458 in the five-year period 1905-1910 to 189 in the five-year period 1925-1930.

Another class of cases which we took up was that of phlyctenular disease. We had come to the conclusion that our method of handling them was both wasteful and ineffective. We were accustomed to admit the more severe cases to the hospital, from which after a variable length of time they were discharged and lost sight of for the time, only to be readmitted for another course of hospitalization. Social service made it possible for us to follow these cases closely through the various clinics of the Massachusetts General Hospital; the children's medical department where other signs of open and closed tuberculosis might be discovered; the nose and throat clinic, where tonsils and adenoids were removed if necessary; and the dental clinic, for the attention to the teeth which they all needed. When we had the whole picture, a conference was called of the various interested persons, and the disposition of the child decided; perhaps eye hospitalization of the child was the first thing needed, perhaps a tuberculosis sanatorium was the place; some could be followed in their homes if the conditions were reasonably hygienic; also, the open-air classes of the schools were made use of. We doctors, from our information and that furnished by social service, made the decision; social service carried it out. We were also enabled to run a class for the adults

who were suffering from ocular tuberculosis, in which some 130 cases were handled; this was largely made possible by the ability (furnished by social service) of following the patients in their homes and seeing that they kept up the régime prescribed for them. A study of 63 of these cases over a period of years was published by Dr. Maud Carvill and myself in 1927. Social service has followed about 2,000 cases of phlyctenular disease in twenty years. At present there are about one-third as many as seven years ago. The recurrences are fewer and less severe. Formerly we used to average twenty-five cases at a time in the nursery; now we seldom have as many as four.

A good many years ago it became evident that our cases of interstitial keratitis were being handled in a thoroughly unsatisfactory and unscientific manner. In a busy hospital clinic it was not possible for the doctor or nurse to establish the personal relation with the patient which it is possible to establish in private practice, and which is absolutely necessary if the best is to be done for the patient. The course of such a case makes these facts evident. It is a progressive disease usually starting in a single eye and advancing more or less unchecked for weeks and months. There is then involvement of the second eye followed by more weeks and months of trouble. There is necessity for very long-continued anti-syphilitic treatment even after the eye disease has subsided. Recurrences are not infrequent. Is it any wonder that these patients became discouraged, wandered from one clinic to another in search of help, and promptly discontinued the rather inefficient general treatment, usually prescribed by the ophthalmologist, when the eyes had quieted? The advent of the social worker changed all this. Here was a definite person always available to whom the mother and child reported at each visit, and who had the time and patience to explain the whole situation, what was to be expected, and what must be done; the importance of long-continued anti-syphilitic treatment if recurrences in the eye and involvement of other parts of the body

were to be avoided. We soon gave up prescribing inunctions, pills and the like, ourselves, and established close relations with the expert syphilological department of the Massachusetts General Hospital, our next door neighbor, which later, to our satisfaction, took over this work. Their social service department then handled these cases, except in so far as the eyes were concerned. The family was regarded from the point of view of public health; as far as possible father, mother and all children were brought to the hospital for investigation and treatment of the disease when it existed. Under this régime, in which social service furnished the necessary connecting link, not only did few patients become discouraged and leave us, but many new ones came to us.

In a report made by Dr. Carvill and the writer, published in 1925, it was shown that approximately 1,000 cases had been handled at our Infirmary in the preceding fifteen years. We analyzed a series of cases treated previous to the beginning of this régime and compared them with a series treated by the new methods. The superiority of the newer method was evident. It is interesting to note here that the incidence of interstitial keratitis among our hospital cases has declined to about one-half in the last fifteen years, five cases per thousand in 1914; 2.7 cases per thousand in 1929.

One more group of cases in which intensive social work has produced striking results is well worthy of mention. As in the other instances previously quoted, we were thoroughly dissatisfied with our glaucoma work. Socially we had given them only desultory attention. Medically we felt that our methods could be improved. Not having the funds to employ a special worker for these cases, we approached the National Society for the Prevention of Blindness, and asked them to finance an experiment in the handling of glaucoma for a period of several years. They agreed, and by March 1, 1928, we had installed our worker, had made the necessary changes in the organization of our clinics and started in. Although our

hospital had handled a large number of glaucoma cases, and although they had been placed on our follow-up list and an attempt made to get the patients back regularly for examination, yet we had constantly been confronted with cases which had evaded us for a long period of time, and which came back with an alarming loss of sight, a loss which we felt could at least have been partially prevented had we had these patients under constant observation. These patients also lacked the personal touch necessary in order to handle them successfully. In most cases we cannot expect improvement; we are satisfied if they hold their own. They are conscious of the fact that, in spite of their treatment, they are not getting any better, they become discouraged, seek other doctors, and finally resign themselves to their fate, give up the drops which have been ordered for them, refuse operation because it offers some risk and does not promise them better vision. We will all agree, I think, that given a case of chronic simple glaucoma in an early stage, it ought to be possible, unless it is an unusual case, to preserve vision indefinitely, or at the least to preserve it over a much longer period of time than would be true were no treatment followed. I cannot help feeling that outside, perhaps, of ophthalmia neonatorum, there is no disease which is so tragic as glaucoma, because it leads to blindness and a very large part of this is preventable. Many patients with glaucoma who attend our eye clinics go blind because we have not the proper machinery and organization to handle them in a suitable manner. The keystone of the solution of this problem in the hospital clinic is, I believe, intensive social work.

We started in 1927 with approximately 250 cases of glaucoma, in the next year the number had risen to about 500, and during the past year we had 740 cases. I feel sure that the 740 patients have had more careful examination at each visit, and a more careful consideration of their cases than one-third of their number had two years ago. The main reason for the increase is that we now hold our patients. The

glaucoma social worker is their friend. They see her every time they come to the clinic. She knows their personal problems. She tells them the whole story of their disease, a thing that the doctor is far too busy to do. They trust her and do as she says. Not infrequently, when we see the need for operation in a case, we use all our arguments to induce the patient to consent, and fail. Formerly there was no appeal. Now we call the social worker and say, "Miss Gorton, an operation is necessary in this case", and almost without exception in a week or two she comes back to us and says that Mr. So and So is coming in, next Monday for his operation.

The amazing increase in our glaucoma work has necessitated a partial reorganization of the clinic. The long and painstaking examination which each glaucoma case requires, and of which a very careful measurement of the visual field is an important part, has led us to give these patients right of way in the clinic, so that all information may be assembled and placed before a senior member of the staff for his decision. It is also one of the reasons why we are increasing the number of our internes in the near future.

If you will permit me, I wish to read a few figures to indicate what our in-

tensive glaucoma work has accomplished. In 1926 we had slightly over 200 glaucoma patients followed intensively, while there were some 300 more to whom a follow-up postal was sent which did not accomplish much.

In 1927 there were 262 glaucoma patients listed for intensive work.

In 1928 Miss Gorton, the worker provided by the National Society and trained in eye work by us, came to us and the real increase began. We handled 582 cases intensively that year.

In 1929 we had a total of 740 cases. For each of the last two years we have had 316 new cases, and we average about ten cases of glaucoma in the outpatient clinic each day. We operated on twice as many cases in 1929 as in 1928, 116 as opposed to 55.

Another class of cases which will repay intensive work is that of the myopic patients. Like glaucoma highly myopic individuals come to us at the stage where, at the most, all we can do is to save a little eyesight from the wreck. The management of these cases should be begun in childhood if any degree of success is to be obtained. We follow up our myopias now, but have done little intensive work. That is for the future.

5 Bay State road.

CONTROL OF THE TENOTOMIZED MUSCLE

MICHAEL GOLDENBURG, M.D., F.A.C.S.
CHICAGO

In order to avoid in so far as possible the uncertainty of new insertion the tenotomized muscle is controlled by suturing it to the conjunctiva.

The ability of a tenotomized muscle to retract to the posterior pole of the eyeball and still function, was demonstrated to the writer in an unusual manner. The case was in a boy who presented himself some years ago with a unilateral congenital ptosis and divergent strabismus. The extrinsic muscles in one eye were apparently normal and functioned accordingly, whereas the other eye remained in the position of extreme abduction and could not be moved in any other direction. After some investigation we came to the conclusion that the external rectus was the only muscle capable of functioning, and that the only procedure open to us, was a complete tenotomy of the external rectus with the hope that a cosmetic result might be obtained, which later could be followed with a partial ptosis operation if feasible.

The external rectus was thoroughly dissected free from its lateral and overlying attachments and completely tenotomized with very little reduction of the divergence. After some lapse of time it was thought that the muscle had probably become reattached too far forward, and we decided to dissect freely again and tenotomize this muscle. This was more difficult than had been anticipated, but after freely separating and retracting the tissues we were able to locate the muscle, which was attached slightly anterior to the entrance of the optic nerve. For this reason we were unable to pick up the muscle with the hook until we had a better exposure of the parts.

The final surgical result was no better than that achieved by the first attempt, but we learned much from this case. First, that a complete tenotomy should never be performed without control of the tenotomized muscle in the presence of a functioning antagonist. Second, that a few strands of a

powerful muscle can exert more pull than a large but weak opponent.

As a result of this experience I discontinued the so-called partial tenotomy technique, and now resort to a complete tenotomy when indicated, but of two grades—that is, a complete tenotomy with a free division of the overlying and lateral attachments and control of the recessed tenotomized muscle; the lesser degree consists of a tenotomy only, with control of the tenotomized muscle. The grade used naturally depends on the degree of deviation, the refractive error, the age of the patient, the muscular tone present; and of the utmost importance is the state of the muscle to be operated and its opponent. It has been my observation that in the convergent strabismus case in particular, in which the refractive error has not been corrected early, the internal rectus is extremely powerful, whereas the external rectus is flaccid and lacks tone, although it may be broad or thick. Such a muscle, when picked up with the hook, gives one the impression of a worn out garter stretched beyond redemption, while the opponent is raised against much resistance. In such a case it has been my experience that it matters very little what operation is used on the weaker muscle, the important factor being the management of the powerful opponent. The use of a modern mechanical tucker under such conditions is very simple, but tends to further stretch a muscle so predisposed, and in such a case it would probably be better to do the tucking operation as first used by Woodruff years ago (sewing, not the later technique). The Riess procedure, I am inclined to think, is best suited for this type of muscle, but again one may say that it is not pertinent—the essential factor is control of the powerful opponent.

We will not, however, go into the

merits or demerits of any one procedure to be used on the apparently weaker muscle, but will confine ourselves to control of the tenotomized muscle. Just why one muscle should be more powerful than its opponent is open to considerable speculation, that is, if one excludes the nondeveloped muscle or nerve supply, or the paretic. The fact remains that in the convergent type the internal rectus is very powerful, while the external rectus is very weak. It is quite possible that at birth both these muscles possessed about the same power, and the now evident difference is but a development resulting from the gradual manifestation of conscious vision, and disharmony between the functions of convergence and accommodation. Whether the more powerful internal rectus is the result of muscle spasm, a greater amount of nerve energy directed to this part, or other causes, is debatable, but we may say that the excessive, continual pull by the internal rectus results in the stretching and apparent flaccid state of its opponent.

With this idea in mind and the conclusion that equally capable surgeons seemed to obtain about the same results with whatever method of operation they favored for the shortening operation, I devised the following method for control of the tenotomized muscle. I have used this technique for a number of years with very happy results, and probably would have reported it before this time, but was under the impression that the procedure was so simple that it surely could not be original. This appears an opportune time to present this report, in view of the lengthy and at times pragmatic discussion which followed the paper of Burch and Grant on muscle surgery, at the meeting of the American Academy of Ophthalmology and Otolaryngology in Chicago this past October.

Technique: The conjunctiva over the muscle to be tenotomized is incised for about 8 or 10 mm. at a right angle to the direction of the tendon and about 1 or 2 mm. back of its insertion. The muscle is then dissected free from its lateral and subconjunctival attach-

ments with scissors and hooks. (Fig. 1.) When this has been thoroughly completed a Prince forceps is applied to the

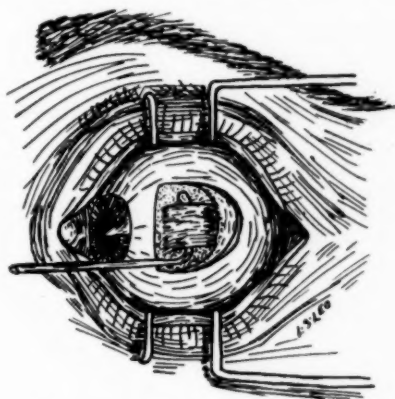


Fig. 1. (Goldenburg). Conjunctiva and deep tissues, dissected and retracted to expose muscle to be tenotomized. (External rectus used to illustrate steps better.)

muscle, 3 or 4 mm. from its scleral attachment. The muscle is then severed with the scissors at a point between the Prince forceps and the scleral insertion. After making sure that all the fibers have been cut we are now ready for our suture. A double armed, fairly heavy (No. 2 braided black silk) suture is used, the needles are passed through the muscle so as to make a loop on the scleral side. (Fig. 2.) The sutures are

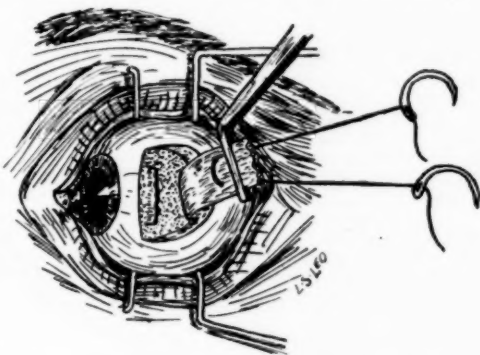


Fig. 2. (Goldenburg). Muscle severed from scleral attachment and held by Prince forceps. Double armed suture through tenotomized muscle.

then carried through the overlying conjunctiva and allowed to remain untied. (Fig. 3.) The primary conjunctival in-

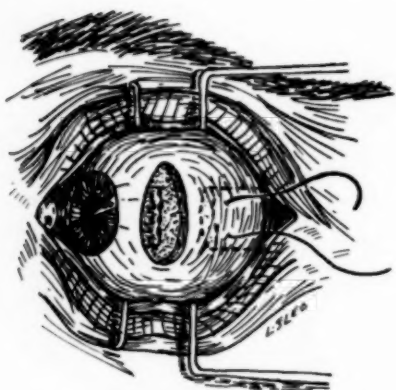


Fig. 3. (Goldenburg). Suture brought through overlying conjunctiva and allowed to remain untied until all work is completed.

cision is now brought together by sutures. If the tenotomy is the first step in the operation, the work on the muscle to be shortened should be completed. When this is accomplished, by whatever method, the results obtained should now be estimated by the surgeon's experience or by whatever means he favors. The untied sutures through the tenotomized muscle should now be tied over the conjunctiva according to the correction desired. (Fig. 4.) That is, if the tucking or advance-

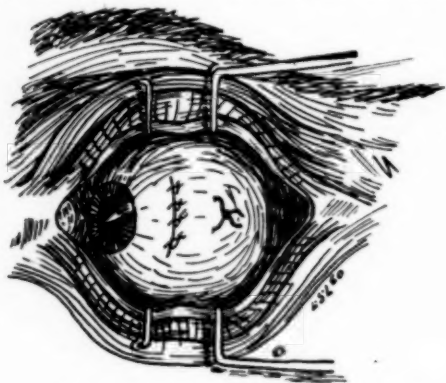


Fig. 4. (Goldenburg). The vertical incision of the conjunctiva is brought together by sutures, and when the work on the opposing muscle is completed, the control suture may be tied or permitted to remain loosely knotted.

ment has not corrected the deviation to the stage desired by the surgeon, the sutures through the tenotomized mus-

cle are tied so as to allow this muscle to retract further. If, in the surgeon's opinion, an overcorrection has taken place by the shortening procedure, the tenotomized muscle is brought forward by drawing these sutures tighter. One may also control the position in the conjunctiva through which this suture is placed, that is, nearer or further from the limbus. In other words, the result desired can be obtained by manipulating the sutures controlling the tenotomized muscle. Most surgeons in such a case desire an overcorrection, which they can obtain without any fear that a divergent strabismus will follow. This may be possible if the sutures are unduly manipulated to the extent that they pull through the tenotomized muscle, but has not occurred in my experience.

The first reaction of the reader will be to object that this is rather haphazard technique. The writer will admit that in the first case the "trust to luck" attitude was assumed, owing to the very difficult situation present, but the result was surprisingly good.

What happens to the tenotomized muscle with this procedure? Nothing startling; it attaches itself to the sclera and overlying conjunctiva. However, I have redissected only two such cases, one, the case alluded to in the opening paragraphs, the second for no better reason than curiosity. The technique is very simple, and the results obtained are at least as good, if not better than any other method known to this operator. One naturally wonders how such results are brought about with what appears to be a method not based on mathematical estimation. The explanation must be theoretical, but not wholly so.

The ability to state definitely how many millimeters the weaker muscle must be shortened, and how many millimeters back of its original insertion the opposing muscle must be attached to the sclera, would make for an ideal operation if it were possible of accomplishment. Some workers are convinced that it is possible, others believe that too many factors are involved to make such measurements dependable. How-

ever, we do know that an advanced or tucked muscle in such a case is frequently so flaccid and lacking in tone that one wonders if it will again be able to function normally—but it usually does. In my opinion, what happens is something more than the mere shortening of one muscle and changing the fulcrum of the opponent. I am inclined to believe that the shortened weak muscle, having been released from the continual traction by its powerful opponent by the tenotomy, recovers much of its lost tonicity. The powerful opposing muscle, being severed from its fixed point of attachment, retracts within the limits permitted by the control suture. Lying thus free and with no fixed point of attachment, the customary nerve energy expended on this muscle, finding little or no resistance, nor the necessity of so much energy, gradually diminishes. This excessive nerve energy expended is and was probably artificial, the result of faulty postnatal develop-

ment or disharmony between accommodation and convergence. The tenotomized muscle eventually reattaches, apparently at a more favorable point, and the shortened or weaker muscle not being subjected to further stretching regains some of its lost tonicity. It would appear that during this evolution secondary to the surgery, the opposing muscles find their own sphere favorable to their function, probably the result of a more equable distribution of nerve energy.

This technique can be applied to any of the four recti muscles where tenotomy is indicated. In the convergent type I prefer to bandage both eyes for from five to seven days. In the divergent type, the eyes are not covered after the first twenty-four hours; convergent exercises are then resorted to if indicated. The sutures are removed in the usual time.

104 South Michigan avenue.

A CASE OF OCULAR EPILEPSY

THOMAS HALL SHASTID, M.D., F.A.C.S., F.A.C.P.
DULUTH, MINNESOTA

Diplopia preceded by manual aura and followed by headaches occurred in this case.

There recently came to me a man of Scandinavian extraction, a very intelligent engineer aged forty-five years. He wished only to be fitted with glasses, yet in his anamnesis there came out certain points which, to me at least, appear to be quite unique.

Since the age of ten, that is for thirty-five years, he has been subject, twice or thrice yearly, to the following kind of attack. Immediately after breakfast his thumbs begin to get numb, then his fingers. Sometimes only one of the fingers, in addition to the thumbs, is affected, rarely the thumbs alone, or just one thumb.

When the thumb, or thumbs, have become completely without sensation, the vision begins to blur. The loss of sight is always only partial, though sometimes very pronounced. It is always accompanied by diplopia, which can invariably be relieved by closing either eye. Whether the blurring disappears simultaneously with the diplopia, on the closure of one eye, the patient could not say. Neither, of course, could he say whether the affected muscles were all in one eye or distributed between the two eyes.

The blurring and diplopia, as a rule, last ten to fifteen minutes, sometimes longer.

When the sight returns, a severe headache comes on, which nothing seems to relieve.

This patient's health is, otherwise, remarkably good. Some years ago, he had

moderate attacks of rheumatism, which were permanently disposed of by the extraction of all the teeth. The tonsils, too, are out. He never has had any traumata of consequence, or general convulsions of any sort.

I found the eyes normal, except as to refraction.

I prescribed, for distance: O.D. + .75 D. cyl. axis 180° , and, O.S. + .25 D. S. + .50 D. cyl. axis 180° ; for near, + 1.25 D. S. added.

I thought it likely that the case was one of ocular (regional, or Jacksonian) epilepsy, and that the thumb-and-finger symptoms were a kind of aura. It is hardly possible that it might have been a case of ophthalmoplegic migraine. For one thing, in ophthalmoplegic migraine the period of pain comes first, the period of paralysis later. In this case, however, that order was reversed. Again, in ophthalmoplegic migraine the pain is almost invariably localized on one side of the head, or even on a part thereof. This, also, was not true in my case. Furthermore, ophthalmoplegic migraine nearly always terminates in an attack of vomiting. This, too, was absent in my case. Still again, in ophthalmoplegic migraine the diplopia does not appear till after the close of the vomiting, and it almost invariably lasts for several days at the very shortest. Finally, there is, in ophthalmoplegic migraine, no manual or digital aura.

207 Sellwood building.

HEMANGIOMA OF THE CILIARY BODY

Report of a case

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HOUSTON, TEXAS

A case of this rare condition is described clinically and histologically with illustrations.

Rodin¹ reported a case of angioma of the iris and in a review of the literature found nine other reported cases. After a study of those reports he concluded that only in three was the diagnosis justified clinically. A review of the available literature, discloses a cavernous angioma of the ciliary body reported by Griffith.² It appears therefore that tumors of this type are very rare.

History: B. C. J., five months of age, was referred by his pediatricist, Dr. N. N. Allen, because the child was in severe pain, apparently from an inflamed right eye. His general examination was negative. An intradermal tuberculin test, and Wassermann reaction were negative, as were also Wassermann reactions of both parents. The mother stated that the child was having recurrent hemorrhages into the anterior chamber, which began without any reason, seven weeks ago. She consulted Dr. J. O. McReynolds, who after a study of the case advised observation. Dr. McReynolds stated in a personal communication that he considered the possibility of a small intraocular tumor.

Examination: When seen first, April 28th, 1929, the infant was in very obvious distress, crying constantly, except when his head was under his mother's arm. He had severe photophobia, lacrimation, and marked bulbar congestion. The tension was high to touch and the anterior chamber was full of blood, making a detailed examination impossible. By April 30th, most of the blood was absorbed; some was settled at the bottom of the anterior chamber. The lacrimation and photophobia were less marked, and the bulbar congestion had also disappeared, except nasally, where, in the angle of the anterior chamber was a very narrow dark brown growth. Examined under an anesthetic, it consisted of a dark dense mass, with a

lighter colored fringe, the latter presumably clotted blood. The cloudy aqueous humor did not permit a satisfactory examination of the fundus. Transillumination was negative. Tension was 80 mm. of mercury (McLean).



Fig. 1. (Daily). Drawing made while the child was under anesthesia.

The child continued to be in severe pain. Instillation of levoglaukosan had no effect on the pain, although the tension came down. A diagnosis of recur-



Fig. 2. (Daily). Drawing of the bisected eyeball.

rent hemorrhages due to an intraocular growth was made, and enucleation advised. The eye was enucleated on May 5th, 1929, and the child made an uneventful recovery.

On opening the eyeball, a dense neo-

plasm, partly white and partly brown was found in the ciliary body; it was 7 mm. long, the width of the ciliary body, and 1 1/2 mm. thick. It produced an iridodialysis, and a brownish portion of it projected into the anterior chamber at the filtration angle.

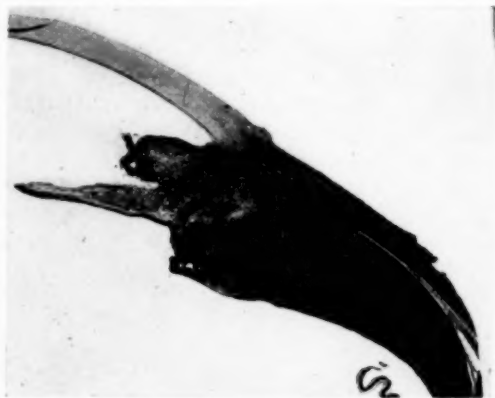


Fig. 3. (Daily). Section through the anterior segment of the eyeball.

The report³ of the microscopic examination is as follows: There is a marked thickening of the ciliary body on one side of the sections, composed of numerous capillary vessels between which are cords of rather large cells with vesicular nuclei. This structure forms a diffuse tumor replacing the normal structure of the ciliary body and extends back to the ora serrata in the choroid. There are several small necrotic areas infiltrated with leucocytes. The neoplasm projects into the anterior chamber at the filtration angle for

about 2 mm. This projection is necrotic and is the probable source of the hemorrhage. There is a dense infiltration, at the filtration angle, of macrophages containing blood pigment. There are deposits of blood pigment in the tumor and a recent hemorrhage separates the posterior portion and the anterior choroid from the sclera. Iris adjacent to

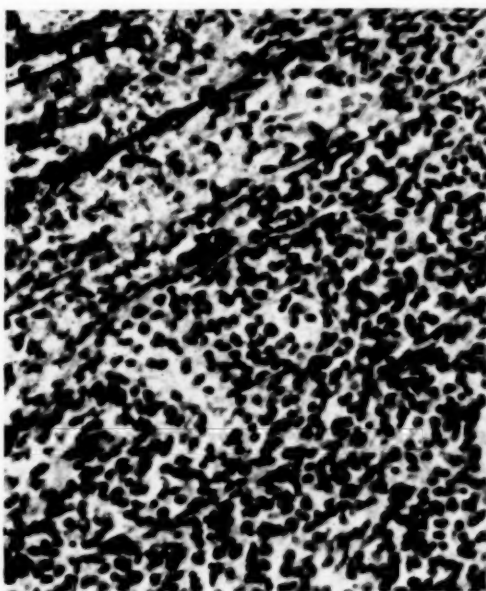


Fig. 4 (Daily). Section of the tumor.

the tumor is short and thick and is infiltrated to a moderate degree with tumor cells. Mitoses are rare. **Diagnosis:** Capillary hemangioma of ciliary body. Recurrent hemorrhage.

1117 Medical Arts building.

References

- ¹ Arch. of Ophth., Dec., 1929.
- ² The Medical Chronicle, 1892, v. 16, pp. 5 and 6.
- ³ The pathological report is by Major G. R. Callender, Registrar of the Division of Ophthalmic Pathology of The American Registry of Pathology at the Army Medical Museum

THE REFLEX-FREE FUNDUS CAMERA

ROBERT VON DER HEYDT, M.D.
CHICAGO

An explanation is given of the modification of the lens system rendering the fundus camera reflex free.

The upper illustration schematically presents the original camera with the lens system which produced the double central reflexes or flares.

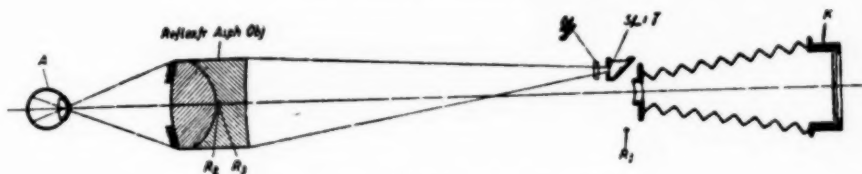
The lower illustration shows the lens system as ingeniously modified in order to eliminate these reflexes. This change in no way affects the ease and simplicity with which photographs of the fundus of the human eye may be taken.

The high degree of convexity necessary on the middle surface unfortunately does not allow of achromatization. To eliminate this fault a Schott yellow filter O.G.1 or G.G.7 is interposed in the illuminating beam. This new reflex-free objective and the filter may be fitted to any Zeiss-Nordenson camera.

The illustration shown is a reflex-



Lens system which produced double reflexes.



Lens system which eliminates reflexes.

The rectangular prism behind the slit deflects the arclight illumination into the eye. The long radius of the first concave lens surface facing the light beam projects its reflex to R_1 . It thus cannot enter the camera. The reflex from the convex surface in the middle of the lens system is quite faint. It is eliminated by a diminutive black spot placed on the center of the lens R_2 . The curvature of the last surface is determined by the prescribed power for the entire lens unit. This lens is made of such thickness that its reflex R_3 also falls on the black spot. In this way all primary flares originating in the lens unit are eliminated.

A combination of certain crown and flint glasses to obtain a sufficient applanatic correction and an accurately computed deformation of the convex surface facing the eye of the patient diminish the corneal reflex.

free photograph of a normal fundus taken with an old camera to which a filter and reflex-free objective had been



Reflex-free photograph of normal fundus.

temporarily fitted. This to prove the feasibility and ease with which an older model camera may be converted into one of the reflex-free type when the optical units for so doing have become available.

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BELL'S PHENOMENON AND THE FALLACY OF THE OCCLUSION TEST

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A discussion of Bell's phenomenon and the inverse Bell's phenomenon is given with the underlying theories usually offered. Report is then made of a large number of cases of normal persons who exhibited the normal Bell's phenomenon on closing the eyes but who were caused to exhibit the inverse phenomenon by forcibly retracting the upper lid. These observations lead the author to conclude that both phenomena are merely protective reflexes. A further series of observations made after occluding one eye of a large number of patients is reported. In this group a majority exhibited a hyperphoria of the occluded eye. The author believes this is merely a manifestation of Bell's phenomenon and not of a latent hyperphoria. The occlusion test is considered misleading in examination for heterophoria. From the Department of Ophthalmology, University of Chicago. Presented before the Chicago Ophthalmological Society, December 15, 1930.

It has long been known that when the eyes are closed, as in sleep or the early stages of anesthesia, they usually turn upward or upward and outward. Bell's phenomenon, as this is called, was originally described in peripheral facial paralysis. In this condition the eye on the affected side is seen to turn upward and outward on attempting to close the eyes. That this condition exists in normal persons, both in sleep and under anesthesia, has frequently been noted. During the winking reflex, when the eye is closed, this same phenomenon is noted. "Maddox and others have called attention to the fact that the normal eye when at rest, that is, in darkness or when the lids are closed, does not occupy the primary position."



Fig. 1. (Abraham). Normal Bell's phenomenon. Patient attempting to close both eyes, observer retracting upper lid.

One can easily see this phenomenon in the normal patient if the upper lid of either eye is retracted and the patient attempts to close both eyes as in sleep. (Fig. 1). On attempting this the observed eye can usually be seen to roll upward and outward.

There is no definite agreement as to the cause of this phenomenon. Previous to 1925 the main hypotheses offered in explanation were two; one, the reflex theory; and two, the comitant theory. The first presumed a reflex arc through the fifth or seventh nerve via the central nerve system to the third nerve. The second theory is based on an assumption of third nerve endings in the orbicularis oculi in addition to those of the seventh nerve. Bing² considers the evidence for existence of third nerve fibers in the orbicularis to be fairly definite. His two reasons therefore, are (1) partial atrophy of the orbicularis in lesions of the third nerve, and (2) the existence of Bell's phenomenon.

Kestenbaum³ and others have described cases of inverse Bell's phenomenon. This condition is characterized by a turning downward of an observed eye when attempting to close both eyes. One case reported by Bouchard⁴ was in a tabetic. Lauber⁴ reported three cases in children with hydrocephalus. Coppez⁴ in 200 normal patients found two cases. Most of the reports, however, have been in long standing cases of lagophthalmos or ectropion, preventing the upper lid from coming down sufficiently to close the eye. Peculiarly enough, in nearly

all the well corrected cases a normal Bell's phenomenon was found in a relatively short time, even within twenty-four hours. Kestenbaum, in presenting his cases, brings forth evidence strongly to support his theory that the phenomenon is an optical reflex beginning in the optic nerve. In one case of paresis of the facial nerve which had almost completely cleared, he found the phenomenon normal (eye turned upward and outward). On keeping the upper lid retracted and raising the lower lid as much as possible, he noted that the eye turned down under the lower lid. On repeating this several times this inverse phenomenon resulted more and more promptly. To rule out the influence of the fifth nerve, he used a card and held this in front of the eye, but not touching the skin, keeping the lower one-half of the pupil covered. The same results were obtained, i.e., the eye turned downward.

Kestenbaum concludes that the eye rotates toward the light source if fixing (fixation reflex), and away from the light source if not fixing (negative fixation reflex—Bell's phenomenon and its inverse). Repetition and perseverance were factors in increasing the strength of the reflex. In death no stimulation of the retina is possible. Neither, however, is the motor side of a reflex arc active. Yet Kestenbaum uses the absence of Bell's phenomenon in death as an argument in support of his theory. Bartels⁵, in discussing the paper, agreed with Kestenbaum that the phenomenon is an optical one but does not believe the light source is a factor.

It is rather difficult to believe that the light source is a factor in determining the rotation of the eyes when no inversion of Bell's phenomenon is produced in the normal persons (according to Kestenbaum). It is also difficult to explain the presence of Bell's phenomenon in the blind. Kestenbaum, in trying to do so, presumes the normal reflex to be so strong because of long standing and repetition that it is not possible to produce an inverse Bell's phenomenon in the normal, and that the phe-

nomenon continues in the blind because of habit. In pathological cases, habit can cause an inverse phenomenon to become ever more natural (reaction time is decreased), yet almost immediately on correction of the defect, the phenomenon usually returns to normal, i.e. up and out.

According to Peter⁶, during sleep and unconsciousness all innervational influences are absent; "the eyes may be said to assume a position of anatomical rest." This position, Peter, Hansell and Bell⁷ place as usually up and out. Certainly it cannot be admitted as true that all innervational influences are absent in sleep or unconsciousness and it must therefore follow that the position of the eyes up and out is not necessarily the position of *anatomical rest*.

It seems more likely that convenience is more a factor in determining the position of the eyes than any anatomical rest or any light source. The upper lid is larger and in seeking protection an additional one is afforded by an upward turning of the eyeball. The idea that the instinct for self preservation is the underlying inciter of this reflex more easily explains this phenomenon as a protective reflex phenomenon, on the same basis as the winking reflex. When an eye is closed to avoid harm or undesirable stimuli, closing the lids and at the same time hiding the cornea is *doubly effective*.

That this reflex is on an instinctive basis is also well supported by finding it present in earliest infancy (Bramwell⁸). The optical factor may also be present in the sense that as long as there is any sensation of light stimuli of moderate intensity it is known that the evident purpose has not been accomplished and this may cause the eye to be moved in other directions than upward and outward in an attempt to find protection. In nuclear lesions of the seventh nerve Bell's phenomenon is absent (Willbrand and Saenger⁹). This lends support to the theory that the reflex is mediated through a lower center, possibly via the median longitudinal bundle to the third nerve nucleus.

Table 1

SHOWING TYPES OF MOTILITY OF OBSERVED EYES IN NORMAL PATIENTS ON FORCIBLE RETRACTION OF UPPER LID OF ONE EYE WHILE PATIENT ATTEMPTS TO CLOSE BOTH EYES.

Patient No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Age	25	3	32	38	52	65	26	27	23	25	22	25	25	34	37	41
Groups	I	+			+	+							+		+	+
	II			+												
	III		+	+	+			+	+	+	+	+		+		

Patient No.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Age	33	20	23	21	30	28	6	8	6	6	10	18	7	6	11	35
Groups	I	+			+	+										
	II						+	+	+	+	+	+	+	+	+	+
	III		+	+	+		+	+			+	+	+	+	+	

Group I Eye behind upper lid

Group II Wandering movements recorded

Group III Eye behind lower lid (inverse Bell's phenomenon)

If Bell's phenomenon is on an instinctive protective basis, then varying the condition should possibly give variable results. In testing for this phenomenon in patients who came to the Max Epstein Clinic of the University of Chicago for correction of some refractive error only, it was noted that where



Fig. 2. (Abraham). Inverse Bell's phenomenon in same patient as Figure 1.

retraction of the upper lid was sufficiently great, and with extreme rotation upward the pupil was still wholly or partially exposed to ordinary light, attempts to close the eyes disclosed very interesting findings. Considering all the cases examined, regardless of the actual success of the retraction of the upper lid in uncovering the pupil, we find we can divide the cases into several groups. One, those completely negative. Here the eye turns upward promptly and stays there regardless of the exposure of the pupil. Group two comprised patients in whom wandering movements were elicited, the exposed eye going slowly from right to left or vice versa, slightly upward and then downward, almost incessantly, looking for "cover," and finally coming to rest in an exposed position, usually in extreme adduction (Table 1). The cases remaining were placed in group three. This group showed the searching movements, to a greater or less extent, with the final rotation of the eye downward behind the lower lid, (inverse Bell's phenomenon.). (Fig. 2). One case showed this

inverse phenomenon so promptly that it was thought this was the normal or usual response for this particular patient (aged 3 years). Other control tests, however, showed that the eyes turned upward and slightly outward when both eyes were closed. When the inverse phenomenon was found it was noted that the closed eye, too, took the position behind the lower lid. In some cases the eye, after several attempts to hide behind the upper lid, would become the fixing eye and attempts to close this eye would cease. In several cases, shielding the entire eye from light tended to avoid this fixing.

The observations were not always constant, the same individual sometimes succeeding in hiding the eye behind the upper lid by excessive contraction of the orbicularis, sometimes the eye would seemingly become content to rest with the pupil exposed, and sometimes the eye would show a changed phenomenon, if not a definite inverse Bell's phenomenon. Cases in which it seemed impossible to get an inverse Bell's phenomenon could sometimes be encouraged to show one by following Kestenbaum's method of raising the lower lid, even covering in this way the whole cornea. Occasionally too, it was possible to demonstrate the following downward of the eye behind the lower lid by pulling this lid gradually downward. In some cases, especially where the eye had come to rest in an exposed position, the wandering movements were renewed or accentuated in further attempts to hide the pupil.

By referring to Table I it can be seen that among the first 22 patients, 9 showed the normal Bell's phenomenon and failed to show any wandering movements. After these 22 the next 10 examined all gave positive wandering movements, and seven of these gave the inverse Bell's phenomenon. Attention is called to these two groups of patients for two reasons; one, the second group of 10 was examined after experience had been gained by observations on the first 22, and it is thought

that this is the main reason why there were no negative results; that is, the first 22 probably also had wandering or inverse movements, but we simply did not find them until our technique was improved. Two, the age average in the second group of 10 cases was much lower than in the first group of 22 cases. It may be argued that habit plays a larger rôle as one grows older, and this may be considered the reason for a smaller percentage of inverse Bell's phenomenon in the first group. The author is inclined to believe that, although age may be a factor, the chief points to be considered are the adequacy of the retraction of the upper lid and the duration of the test. In the first 22 cases, 9 or 40.9% failed to show an inverse Bell's phenomenon; in the second group of 10 cases 3, or 30% failed to do so. In the whole group of 32 cases 12, or 37.5% failed to show an inverse Bell's phenomenon, while 20 or 62.5% actually showed this phenomenon.

Before continuing with a presentation of the second part of this paper it should be emphasized that the above modifications of Bell's phenomenon in normal eyes, and especially the inverse Bell's phenomenon, while almost entirely new, were incidental to indicating the probable instinctive basis for this phenomenon. One should bear in mind that practically all normal individuals show a (typical) Bell's phenomenon; i.e., the eyes turn up behind the upper lids when the lids are closed. A tendency toward this "protection turning" is also to be noted when the eye is simply shielded or when in darkness without fixation.

It seems very likely, from the above findings, that the occlusion of an eye, especially by a patch or bandage, may well give rise to a change in position of the eye so treated. F. W. Marlow¹⁰, O'Connor,¹¹ and others have been staunch supporters of such a method to make manifest latent heterophorias. The committee¹² appointed by the Section on Ophthalmology of the American Medical Association favorably comments on Marlow's occlusion test as a

clinical test for latent heterophorias. Even E. Fuchs¹³ in a recent American address, seemed favorably impressed with this "occlusion test." However, there are no data in the literature which help one to determine whether or not Bell's phenomenon is a factor to be considered in a discussion of the occlusion test. For instance, no appreciable amount of data is even presented as to which eye was covered during the test and what the corresponding result was. Marlow, Clark,¹⁴ and Fink¹⁵ advise covering the less dominant eye.

Fink was the first to call attention to the high percentage of hyperphoria found by this method. He found that 33 of 35 carefully chosen cases showed hyperphoria and said that these were very probably not to be considered pathological. Maddox¹⁶ vaguely discusses the occlusion test and relates the condition found to the phenomena which occur at the beginning of sleep. He thinks "strange postures" are due to incoordination—proprioceptive reflexes are one-half sleep. F. W. Marlow,¹⁷ answering Maddox in another article, mentions the fact that by the occlusion test esophoria frequently becomes exophoria, but the reverse situation is never found. He says nothing about this peculiar fact and its possible relation to Bell's phenomenon. He emphasizes the importance of keeping the eyes covered long enough to permit as complete dissociation of the two eyes as possible with the "fusion faculty taken to pieces." It is the purpose here to present data to show that the occlusion test will show that type of hyperphoria, depending on the eye covered.

The technique followed in making the tests did not differ materially from that used by most authors on this subject. As the intent of the supporters of the test is to dissociate the eyes as completely as possible, an eye pad was used instead of an opaque lens. In this way the patient does *not* have to *try* to avoid doing what is practically impossible; that is, the patient does not have to continually ignore impulses coming from the side. The eye is closed, fu-

sional impulses are of no avail, and results can be considered to occur more promptly and to be more dependable. The exact technique followed agreed fairly closely with that described lately by C. M. Swab.¹⁸ A thick sterile gauze pad is placed over the closed eye and strips of adhesive plaster applied to keep the pad in place and avoid "peeking" on the part of the patient. Sufficient gauze and adhesive were used to avoid any sharp light impulse. It is not easy to manage to produce the effect of total darkness by such bandaging but the very faint diffuse light passing through the two or three layers of gauze and cotton and the lids was negligible. Three or four of those cases reported negative admitted "peeking" through a loose corner of the bandage. In only one case was a bandage changed during the test, and in this case both eyes were kept closed while the bandage was removed and replaced by a clean bandage over the same eye. There was at no time more pressure on the eyeball than is ordinarily exerted by application of a gauze bandage with adhesive in any ordinary eye condition requiring a simple bandage. At no time was the patient conscious of any undue pressure.

Before removing the bandage for making the test, the patient was seated in a chair facing the object of fixation which was twenty feet away. Both eyes were closed and the De Zeng phorometer was adjusted for the patient and properly levelled. The Maddox rod was placed in position for one or the other eye. It was first aimed to have the rod before the eye bandaged, but it was early noted that this was not an important point; the test could be done with the Maddox rod first before one eye and immediately repeated with it before the other eye without affecting the results. The eyes were kept closed while the bandage was loosened, the room was in semi-darkness when the bandage was removed and the phorometer placed before the patient with his forehead in contact with the head rest. The small light, twenty

feet away, was then turned on while all other sources of light were eliminated, and then, and only then, was the patient allowed to open both eyes. Each eye in turn was then covered to be sure the patient was seeing what it was intended he should see; namely, with one eye, a spot of light, and with the other a line of light. The Maddox rod was always adjusted so that the patient saw a horizontal line, testing first in this way the more important, the vertical "phoria." The horizontal balance was not always examined next for two reasons. One, the author was more interested in learning whether the sursumductions present supported the amount of vertical "imbalance" found; and two, it was and still is, the opinion of the author¹⁰ that the interpretation of findings in the horizontal meridian requires many more data and the data are less simply studied than those in the vertical meridian. However, the horizontal muscles were examined both as to the phorias and as to the ductions present. The tests at near were not done for several reasons, chiefly however, because these near tests would vary too much and too erratically from the distance findings if for no other reason than that the condition found by the occlusion test usually changes very rapidly, as Swab¹⁸ has also pointed out. Clark¹⁴ reports signs of a paresis with the red glass and the candle test, and Swab, too, reports diplopia with a red glass before one eye. In the dark room with only the single source of light at twenty feet spontaneous diplopia was present in more than three-fourths of the positive cases. This finding, however, cannot be considered as evidence of a real paresis but deserves further consideration in a discussion of the cause of and the relation between phorias and pareses. This must be delayed, however, for another time.

The direct findings in the vertical meridian immediately after the vertical "phorias" supported these "phoria" findings (see previous article on this subject by the author¹⁰). The horizontal duction readings supported Duane's

contention (quoted and disagreed with by Marlow²⁰) that the occlusion test resulted in decreased convergence power. Adduction was practically always found much under what the patient showed under ordinary conditions.

Table II shows 48 separate tests, with the patient's complaint in each case. While there were 48 separate tests, there were not that many patients as in some the test was done more than once. All these patients were tested either before or long after the occlusion test had been applied. Of the 40 patients tested only 6 showed hyperphoria by the special test previously described.¹⁰ Each patient was examined by the occlusion test as described above. The average number of hours an eye was covered was 23, with a minimum of 6 and a maximum of 73. Clark¹⁴ suggests 24 hours as a sufficient period of occlusion. H. Barkan,²¹ in reporting on 1,000 cases, gives 24-36 hours as the period of occlusion. Others occlude the eye even longer. Of the total number, 6 patients had first one eye and later the other eye bandaged, the interval between tests being at least one week.

Each of the 6 patients who had first one eye and then the other eye covered (Table II, tests 36 to 48 inclusive), showed a right hyperphoria when the right eye was covered and a left hyperphoria when the left eye was covered. This finding, although noted in but six cases, certainly suggests that the occlusion test is not uncovering a latent hyperphoria, and when considered together with the remainder of the data, indicates that the occlusion test may merely be a subjective proof for the known, objectively noted, Bell's phenomenon. Of the 48 tests, 37 showed definite hyperphoria. Of 18 tests in which the right eye was covered, *all* showed a right hyperphoria. In 19 tests in which the left eye was covered, *all but one* showed a left hyperphoria, and this one exception was known to have even more right hyperphoria than the occlusion test showed (left eye covered).

Table 2
SHOWING RESULTS OF OCCLUSION TEST IN EACH CASE

Patient No.	Test No.	Complaint	Operation	Eye Covered	Hours	Hyperphoria Found After—Before Occl.	
274	1	Refraction	None	R	17	0	0
1603	2	Volunteer	None	R	9.5	0	$\frac{1}{2}$ R
21736	3	F.B.L.C.	Removal	L	24	0	0
16578	4	Volunteer	None	R	15	0	1 L
21732	5	F.B.L.C.	Removal	L	17	0	0
10298	6	Volunteer	None	L	7	0	0
23682	7	Hordeolum	None	R	18	0	0
766	8	F.B.R.C.	Removal	R	22	0	0
19028	9	F.B.R.C.	Removal	R	18	0	0
19443	10	Entropion	Plastic	R	21	0	0
20571	11	F.B.R.C.	Removal	R	17	1 R	0
19805	12	Dacro.	Dacrocystectomy	R	21	$\frac{1}{2}$ R	0
13256	13	Chalazion	Curetment	R	17	$\frac{1}{2}$ R	0
19287	14	Chalazion	Curetment	R	19	$\frac{1}{2}$ R	0
1x	15	Chalazion	Curetment	R	21	2 R	0
2x	16	F.B.R.C.	Removal	R	17	2 R	0
3x	17	F.B.R.C.	Removal	R	17	1 R	0
4x	18	F.B.R.C.	Removal	R	16	$\frac{1}{2}$ R	0
18655	19	F.B.R.C.	Removal	R	22	1 R	0
19505	20	F.B.R.C.	Removal	R	23	2 R	0
4663	21	Xanthelasma	Excision	L	18	1 L	0
6279	22	Migraine	None	L	8	2 R	$2\frac{1}{2}$ R
12037	23	F.B.L.C.	Removal	L	23	1 L	0
19425	24	Chalazion	Curetment	L	18	$\frac{1}{2}$ L	0
20825	25	Chalazion	Curetment	L	20	3 L	1 L
6684	26	Volunteer	None	L	73	$2\frac{1}{2}$ L	0
11796	27	Chalazion	Curetment	L	20	$\frac{1}{2}$ L	0
21705	28	F.B.L.C.	Removal	L	21	$2\frac{1}{2}$ L	0
20967	29	Chalazion	Curetment	L	17	2 L	$1\frac{1}{2}$ L
18498	30	F.B.L.C.	Removal	L	19.5	2 L	0
18673	31	F.B.L.C.	Removal	L	22	$\frac{1}{2}$ L	0
22122	32	F.B.L.C.	Removal	L	18	$\frac{3}{4}$ L	0
2565	33	Volunteer	Bone	L	18.5	$\frac{3}{4}$ L	0
10803	34	Chalazion	Curetment	R	17	0	0
	35	Chalazion	Curetment	R	24	1 R	0
8735	36	Trachoma	Expression	R	19	3 R	$\frac{1}{2}$ R
	37	Trachoma	Expression	L	22	1 L	$\frac{1}{2}$ R
5x	38	Volunteer	None	R	10	1 R	0
	39	Volunteer	None	R	13	$1\frac{1}{2}$ R	0
	40	Volunteer	None	L	42	2 L	0
7760	41	Trachoma	Expression	R	50	$3\frac{1}{2}$ R	0
	42	Trachoma	Expression	L	46	$1\frac{3}{4}$ L	0
2241	43	Trachoma	Expression	R	19	$2\frac{1}{2}$ R	0
	44	Trachoma	Expression	L	42	$2\frac{1}{2}$ L	0
8467	45	Trachoma	Expression	R	19	$1\frac{1}{2}$ R	0
	46	Trachoma	Expression	L	23	1 L	0
3585	47	Volunteer	None	R	8	$1\frac{1}{2}$ R	0
	48	Volunteer	None	L	9.5	$\frac{1}{2}$ L	0

F.B.L.C. = Foreign body left cornea

F.B.R.C. = Foreign body right cornea.

Hyperphoria when shown was of the occluded eye in all but one case.

Of those cases which showed hyperphoria before the occlusion test, in addition to the one just noted, two showed no hyperphoria after occlusion, two showed left hyperphoria before and an increase of left hyperphoria after occlusion of the left eye, one showed an

increase of the right hyperphoria from $\frac{1}{2}^{\Delta}$ to 3^{Δ} when the right eye was occluded, but changed to 1^{Δ} of left hyperphoria when the left eye was covered.

In more than one-half of these cases homatropine or atropine refractions were done, but in no case was the re-

fractive error of such an amount as to cause less than 0.8 uncorrected vision, and in no case was it considered a factor in the results. As mentioned in an earlier article¹⁹ it has been shown that refractive errors, even of high degree, cannot be considered factors in causing a hyperphoria in any appreciable percentage of cases.

The author not only agrees with Fink, that most hyperphoria as shown by the occlusion test should not be considered pathological, but goes even further and states that the occlusion test is not a test for latent heterophoria and its use can only delay a proper respect for heterophorias in general. That authors have reported good clinical results by prescribing prisms in cases in which the occlusion test has been done, cannot easily be explained without a detailed study of the cases in which such results were obtained. Such details are, to a large extent, missing in most of these reports. One can suggest, however, that the success may very well be due to conservative treatment, and as most of the cases reported showed some hyperphoria before the occlusion test, this conservative treatment resulted in a close agreement with the amount indicated by the ordinary Maddox rod test. Only recently Swab¹⁸ reported on the results of the occlusion test and his report illustrates what the writer means. His case 2 showed "one to 3 degrees of left hyperphoria" at distance and "two to four degrees of left hyperphoria" at near by ordinary Mad-

dox rod test. One degree base down in left lens was prescribed in addition to one degree base in in right lens for an exophoria together with refractive correction. The patient was at least partially relieved after this prescription and muscle exercise, but returned fifteen months later for further examination, at which time the occlusion test was done and revealed "3.5 degrees left hyperphoria" at distance and "4 degrees of left hyperphoria at near." The left lens was changed to include two degree prism base down. The author then reports patient "no longer nauseated." His case 3 is a similar one. Various obvious objections due to lapse of time and incompleteness of tests could be raised against the other two cases he presents. That this author found it necessary to remove some of the prisms prescribed according to the occlusion test does not seem surprising.

Conclusion

1. Bell's phenomenon is in the nature of a protective mechanism devised by nature; it is instinctive. As such, it belongs to that group of instinctive reflexes as, for example, the winking reflex.

2. Modification of Bell's phenomenon, such as the inverse of it, can be demonstrated in normal individuals.

3. The occlusion test is a subjective test for demonstrating the presence of Bell's phenomenon and is not a test for latent heterophoria.

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WHAT CONSTITUTES SATISFACTORY CYCLOPLEGIA?

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A study of many cases was made to determine how much the accommodation need be reduced in order satisfactorily to determine the full refractive error. Younger individuals and those with greater accommodative power required a more effective cycloplegic and more frequent application to produce the desired result. Two to three diopters' residual accommodation permitted as satisfactory refraction as higher degrees of cycloplegia. Numerous cases are reported in some detail. Read before the Pacific Coast Oto-Ophthalmological Society, Victoria, B.C., Sept., 1930. From the Section on Ophthalmology, The Mayo Clinic.

The question as to what constitutes a satisfactory state of cycloplegia for determining refractive error in young persons is, I believe, of significance to all ophthalmologists. Whether a cycloplegic is used as a routine or only occasionally in examining the eyes of young persons, the dosage and effect of the drug on the accommodation should be accurately known. It is possible and desirable to obtain such information in individual cases, in order that we may be guided scientifically in the use of a cycloplegic. Blanket rules and dosage do not apply. Because a stated amount of any given drug has been instilled in an eye, it does not necessarily follow that ample cycloplegia has been produced. It may be adequate, insufficient or excessive. If adequate, well and good; if insufficient, the results may be erroneous, and if excessive the patient has been needlessly embarrassed. When a cycloplegic is required, there should be a level to which it is necessary to reduce the accommodation so that the refractive error can be determined without interference by accommodation. Reduction of the accommodation short of this amount would be likely to give erroneous results. Lowering of the accommodation past this adequate level should be unnecessary. It is obvious that recovery is quicker from smaller doses of a drug.

It is the custom of many ophthalmologists to use a number of drops of a certain solution, a certain number of minutes apart, and at the end of a given time to examine the patient, assuming that the eyes are sufficiently relaxed to reveal the error. This formerly was my practice also. It is said that the pupils

are dilated, the retinoscopic and subjective observations check, and the patient wears the glasses given him with comfort. This may all be true and yet no knowledge of the degree of the cycloplegia produced has actually been obtained. It has been assumed that the accommodation is relaxed, but to what extent or to how many diopters of power has not been determined.

It might be taken for granted that a drug is used to suspend totally the action of the ciliary muscle in order that the full error may be found. I was much chagrined a number of years ago to learn that instead of producing total cycloplegia I was producing only a fraction. By my routine procedure, the accommodation was reduced only to the level of from 2.5 to 4 diopters, and yet I was finding what seemed to be the error with the retinoscope and the patient was accepting it. What then was the answer? If cycloplegia was necessary, how could we find the error, and yet have such a high residual accommodation? Was our original premise wrong? When a cycloplegic is deemed essential, how much need the accommodation be reduced in order to find the full refractive error? I have endeavored to find the answer to this question.

In routine refraction, the accommodation plays a major part. A knowledge of the state of accommodation in each individual is absolutely necessary in the proper treatment of the case. It determines not only the needs of the patient in strength of lens, but by what methods he should be examined. What, if any, and how much of, a cycloplegic should be used? I believe that it is a common practice not to measure the

accommodative power of young persons during the course of examination, to determine the refractive error. It is taken for granted that because they are aged less than forty years they have ample accommodation, and that correction of static error will be sufficient for all purposes. This is indeed an error. As Duane² pointed out, subnormal accommodation occurs in 5 percent of patients aged from twenty to forty-five years. The mere correction of their static error is not enough. Furthermore, they need less, if any, cycloplegic. There is a definite number of persons who have abnormally powerful or sustained accommodation for their age. Such persons need less correction of error and more cycloplegia. There is great variance in what I like to call the quality of various ciliary muscles. This quality or tone of the accommodation should influence materially one's final judgment of the needs of the eyes for a cycloplegic and for glasses. The power, tonus and quality of the ciliary muscle and not the age of the subject should be the determining factors in the selection of and in the dosage of a drug for relaxing the accommodation.

The amplitude of accommodation should be determined as a routine in all persons who are not definitely presbyopic. The near point of accommodation in centimeters divided into 100, with glasses if any are worn, gives the amplitude in diopters. Duane¹ and Jackson published tables showing the accommodative power at different ages. Duane's last paper on the subject gave the values in minimum, mean and maximum. The average accommodation in five-year periods is shown here in table 1. Adherence to this practice soon gives one definite and invaluable knowledge of the rôle of accommodation in refraction. The accommodative needs of the patient, both as to a cycloplegic and strength of lenses is estimated at once. For example, a patient with 6/6 vision, with a near point of 15 cm., will need more cycloplegic than one of the same age and vision but with a near point of 20 cm. From a medicolegal standpoint one should always determine the ac-

commodative power before using a cycloplegic. Certain persons may claim that there is permanent reduction in accommodative power following use of the drug. Definite preliminary information prevents its use in case of lowered accommodative power until all the facts are obtained, and protects one from false claims.

The selection of the cycloplegic to be used is not of as much interest as the effect finally obtained from use of a preferred drug. There are two main types of cycloplegic drugs, the powerful type such as atropine, and the weaker type, such as homatropine. These are used at The Mayo Clinic. Atropine is used for children because of the power of accommodation. Atropine combined with homatropine is used in early adolescence. Homatropine in graduated doses is used from adolescence on in amounts deemed necessary until the accommodative age is reached when a cycloplegic seems unnecessary. Atropine is used in 1 percent solution, 1 drop on consecutive half days until the desired effect has been produced. After some experimenting I began to use homatropine in gelatin disks combined with cocaine, each disk containing 1/50 grain of homatropine hydrobromide and 1/50 grain of cocaine hydrochloride. I believe that the gelatin disk lies in contact with the globe longer, less of it runs out with the tears, and hence the drug is more effectively absorbed. Other drugs or other forms of these drugs may be used; the only criterion required is the reduction of the accommodation to the level which is regarded as satisfactory.

After a decision has been made by the state of the accommodation that a cycloplegic is necessary, the question arises as to which one to employ and how much of it to use. I believe it is proper to use only that amount which will reduce the accommodation in each person to the presbyopic state. Most ophthalmologists will probably agree that, in a person aged fifty years with presbyopia, the refractive error can be determined without the use of a cycloplegic. Yet his average accommodative power is 1.9 diopters (table 1). It is not

Table 1

FIVE YEAR AGE PERIOD VALUES OF NEAR POINTS

Age, years	Near point, diopters	Amplitude, diopters
10	7.5	13.4
15	8.1	12.3
20	9.0	11.1
25	10.0	9.9
30	11.5	8.7
35	13.7	7.3
40	17.2	5.8
45	27.7	3.6
50	52.6	1.9
55	76.9	1.3
60	83.3	1.2
65	100.0	1.0

considered necessary to reduce the power in order to find the refractive error. This, I believe, is the key to the answer as to how much the accommodation must be reduced in order to find the refractive error, regardless of age. Most of us believe we can work out the error of a person aged forty-five years without a cycloplegic. The accommodation of the average person at this age is 3.6 diopters. The optimal level of reduction for the accommodation by a cycloplegic in order to find the refractive error is probably somewhere between 2 and 4 diopters. It is uncommon, I believe, not to be able to find the error in a subject aged fifty years (2 diopters) without a cycloplegic. In persons aged forty-five years it is more common, but still rare, to have to use a cycloplegic.

After a cycloplegic has been used and the patient's accommodation is supposedly sufficiently relaxed, the residual accommodation should be determined. The near vision should now be indistinct, so that a +3.00 diopter lens is placed in front of the eye enabling the subject to see fine print. The near point and the far point are measured in centimeters. These are divided into 100, giving the values in diopters. Making use of the equation $A = P - R$ where A represents the amplitude of accommodation, P the near point, and R the far point, the residual accommodation is obtained. One can also subtract the value of the +3.00 lens from the near

point in diopters, and obtain approximately the same result. In either case, however, if the patient has any appreciable hyperopia or myopia, allowance for this error must be made. Myopia will cause an apparent increase and hyperopia a decrease in the true residual range. Therefore, it is my practice to estimate the refractive error carefully, and then add a +3.00 lens to get the values P and R. If the residual range is satisfactory the result is deemed correct. When a high residual range is found, more cycloplegic is used and the refraction is repeated. Which of these two methods of determining the residual accommodation gives the more accurate information is an open question. When the correction is placed in front of the eye which is controlled by a cycloplegic, it is thought that R becomes infinity. Therefore $A = P$. The near point of accommodation then, minus the +3.00 lens supplied, should give the residual power. On the other hand, the eye, if completely relaxed and emmetropic, with its correction should read only at 33 cm., the focal point of the +3.00 lens supplied. Any range of P and R should be an index of the residual accommodative power. Personally I prefer to take the range. In the cases here reported both methods were used for comparison. The residual range runs consistently 0.5 to 1.0 diopter higher than the accommodative near point. For practical purposes, however, they show the same result, and either can be used. It might be said after a cycloplegic that, with correction, a patient with a residual range of 3 diopters could read. With dilated pupils and only 3 diopters range, near vision is very indistinct. Many patients would have great difficulty in giving information as accurate as if the +3.00 lens were added to give distinct vision. Table 2, which represents the equivalent values in diopters of the near points from 10 to 50 cm., furnishes a quick aid in finding values of P and R; one need only to subtract the values to obtain A.

In making this study the records of sixty-six cases were tabulated. These cases were selected as a cross section

Table 2
EQUIVALENT VALUES OF CENTIMETERS
AND DIOPTERS

Centi- meters	Diop- ters	Centi- meters	Diop- ters	Centi- meters	Diop- ters
10	10.0	24	4.1	38	2.6
11	9.0	25	4.0	39	2.6
12	8.3	26	3.8	40	2.5
13	7.7	27	3.7	41	2.4
14	7.1	28	3.5	42	2.3
15	6.6	29	3.4	43	2.3
16	6.2	30	3.3	44	2.2
17	5.8	31	3.2	45	2.2
18	5.5	32	3.1	46	2.1
19	5.2	33	3.0	47	2.1
20	5.0	34	2.9	48	2.07
21	4.7	35	2.9	49	2.04
22	4.5	36	2.7	50	2.00
23	4.3	37	2.7		

of material observed on different days over a period of several months. In each case the age, cycloplegic and dosage, refractive error found with varying dosage, and the relation of the residual accommodation were determined. The residual accommodation was measured in thirty-five cases both in terms of range and in accommodative near point for comparison.

The following type cases are illustrative of the points under consideration. They are divided into four age periods: group 1, ages seven to nineteen years; group 2, ages twenty to twenty-nine years; group 3, ages thirty to thirty-nine years, and group 4, ages forty to forty-five years.

GROUP 1

For the younger persons in group 1 atropine was used. As age advances atropine was mixed with homatropine and finally homatropine and cocaine were employed.

Case 1.—The patient was aged seven years. One drop of atropine was used. After one hour a $+0.75$ spherical error was found but the residual range was 8 diopters; this high range indicated inadequate cycloplegia. The patient was advised to return later for more atropine and for repetition of the refraction.

Case 2.—The patient was aged eleven years. One drop of atropine was used

on four consecutive mornings and afternoons. One hour after the second drop, the error in the right eye was $-1.00 = +2.50 \times 90$; in the left $+1.50 - 3.25 \times 175$; the residual range was 2 diopters in each eye. No change in either error or residual range was found after a third and fourth drop.

Case 3.—The patient was aged twelve years. One drop of atropine was used on three consecutive mornings and afternoons. After the second drop the error in the right eye was $+0.25 = +0.75 \times 85$; in the left $+0.25 = +0.75 \times 90$; the residual range was 2.4 diopters in each; a third drop altered neither range nor error.

Case 5.—The patient was aged fourteen years. The right eye was enucleated. One drop of atropine was used which disclosed an error in the left eye of $+8.50 = +0.50 \times 90$ with residual range of 2.4 diopters. A second drop reduced the residual range to 0.4 diopter, but further error was not found.

Case 6.—The patient was aged fourteen years. One drop of atropine was used. After one hour the error in the right eye was -1.75 sphere; in the left eye -1.25 sphere; the residual range was 3.5 in the right eye and 2 in the left. The higher residual range observed in the right eye aroused suspicion.

Case 12.—The patient was aged sixteen years, with amblyopia of the right eye. One drop of atropine was used morning and afternoon. The error in the right eye was $+2.00 = +0.50 \times 180$; in the left $+0.75 = +0.50 \times 165$; the residual range was 2.7 diopters. Additional drop of atropine reduced the residual range to 1.8 diopters but further error was not found.

Case 13.—The patient was aged seventeen years, and had a convergent squint. One drop of atropine was used in the morning and afternoon. The error in the right eye was $+1.50 = +0.25 \times 35$; in the left eye, $+1.75 = +0.75 \times 130$; the residual range was 2.8 and 2.9 diopters. Additional drop of atropine failed materially to affect the error or residual range.

Case 14.—The patient was aged seventeen years, an average refraction case

for his age; had an amplitude of 8.3 diopters before a cycloplegic was given. Two homatropine cocaine disks were used, and the residual range was reduced to 2.4 and 1.7 diopters. The error found was right eye $+ .25 = + .25 \times 105$, left eye $+ .25 = + .50 \times 85$.

The average dose of atropine in 1 percent solution seems to be 2 to 3 drops, reducing the residual accommodative range to less than 3 diopters. The optimal level appears to be 2.5 diopters, below which the error found does not seem to increase.

GROUP 2

In this group homatropine was employed in 2 percent solution, or in disk form combined with cocaine. Preference was given to the latter because of increased efficiency in administration in an office and in reducing the accommodative power. Fewer disks than drops are required, and results seemed to be more uniform. In a previous study⁴ I found that the residual range was much higher after 4 to 6 drops of 2 percent homatropine and cocaine solution than when only 2 disks of the same drugs were used.

Case 17.—The patient was aged twenty years. Three consecutive drops of 2 percent homatropine were used. A low hyperopic error, right $+ .25 = + .50 \times 70$, left $+ .25 \times 90$, with residual range in the right eye of 2.3 diopters, and in the left of 2 diopters was found. The residual range was reduced by a third drop to 1.3 diopters in the right eye and 1.0 diopter in the left, but further error was not found.

Case 18.—The patient was aged twenty years and had an old traumatic cycloplegia in the right eye; no cycloplegic was given; 2 disks were used in the left eye. The error in the right eye was $+ 1.75 = + .50 \times 85$; in the left eye, $+ .25 = + .25 \times 90$. The residual range in the left eye was 2.3 diopters. The difference in error, the result of cycloplegia caused by trauma in one eye and cycloplegia caused by drug in the other may be noted. Possibly both eyes basically were nearly the same, but the drug

did not touch a phase of the accommodation affected in the other eye by trauma.

Case 19.—The patient was aged twenty-one years and represented a typical uncomplicated case of refraction for that age. The amplitude before cycloplegic was given was 11 diopters in both eyes. Two disks were used, and a high compound hyperopic error, right $+ 3.00 = + 2.00 \times 90$, left $+ 2.25 = + 1.25 \times 90$, was found, with residual range reduced to 2 diopters in the right eye and 2.2 diopters in the left eye.

Case 20.—The patient was aged twenty-one years. Two disks of homatropine and cocaine were used. The error in the right eye was $+ .25 = + .25 \times 95$; in the left, $+ .25 = + .25 \times 80$; the residual range in the right eye was 3.2 diopters; in the left, 4.1 diopters. A third disk of homatropine and cocaine increased the cylindrical error to $+ .50$, and the residual range was reduced to 1 diopter in each eye. It appeared necessary to give the third disk.

Case 22.—The patient was aged twenty-two years. Two disks of homatropine and cocaine were used; a compound myopic error, right, $- 1.50 = -.25 \times 10$, left, $- 1.00 = -.25 \times 175$, was found with a residual range of 1.7 in the right and of 1.3 in the left. A third disk of homatropine and cocaine did not change the residual range or error and seemed unnecessary.

Case 27.—The patient was aged twenty-five years. One disk of homatropine and cocaine was used; a compound hyperopic error, right $+ 1.25 = + .50 \times 90$, left $+ 1.00 = + .50 \times 95$, was found, with a residual range of 1.8 in the right eye, and of 1.6 in the left eye. I intended to use 2 homatropine and cocaine disks but the low residual range seemed to make this unnecessary.

Case 34.—The patient was aged twenty-seven years and showed a more accurate determination of the refractive error after administration of the second disk. The error after the first disk was, right $- .25$ S., left $+ .25 = + .25 \times 95$; after the second disk, right emmetropic, left $+ .25 = + .50 \times 110$. The residual range was reduced from

4.3 to 1.9 diopters in the right eye and from 3 to 2 diopters in the left eye.

The average dose in this group was 2 disks. From 3 to 4 drops of homatropine solution seemed necessary to produce the equivalent effect. As a rule, a third disk appeared unnecessary. The residual range should be between 2 and 3 diopters. No advantage seemed to be gained by dropping it below 2 diopters.

GROUP 3

Much the same cycloplegic was used in this group, except that as the fortieth year was approached with its lessened accommodative power, the amount of the drug used was lessened. In the latter half of this period 1 disk was often used instead of 2 disks, or 1 to 2 drops of homatropine solution. This is determined by the accommodative power above or below the normal values for the age.

Case 41.—The patient was aged thirty-two years. One disk of homatropine and cocaine was used; a high hyperopic error, right $+3.00 = +.25 \times 85$, left $+3.00 = +.25 \times 30$, was found with residual range reduced to 2 diopters for each eye. Although the error was high, it seemed useless to give more of the drug.

Case 42.—The patient was aged thirty-two years and was blind in the right eye. The left eye had an amplitude of 10 diopters. Following the administration of 1 drop of 2 percent homatropine, a low hyperopic error, $+.25 = +.50 \times 180$ was found with residual range of 2.2 diopters. More cycloplegic was not indicated.

Cases 43 and 44.—The patients were aged thirty-three years and represented average uncomplicated refraction cases observed for this age. Two disks of homatropine and cocaine were used; medium compound hyperopic errors were found with residual range reduced to 2 diopters.

Case 48.—The patient was aged thirty-four years and showed a residual range of 2.1 diopters with a high mixed astigmatic error, right $-1.25 = +5.50 \times 75$, left $-.50 = +5.00 \times 90$, after 1 disk of homatropine and cocaine

was used afternoon and morning. A gradual instead of forced cycloplegia is of advantage in some cases.

Case 53.—The patient was aged thirty-seven years and showed manifest error of $-.25 = -1.00 \times 10$, $6/10$ in the right eye and of $-.25 = -1.50 \times 180$, $6/10$ in the left eye. After 2 drops of 2 percent homatropine, the residual range was 1.6 diopter in each eye; in the right eye the error was found to $-.75 = +1.75 \times 100$, $6/7$ and the left eye to $-.75 = +2.00$, $6/7$. The original amplitude of accommodation was 8.3 diopters. Contrast between manifest and cycloplegic findings is obvious.

Case 56.—The patient was aged thirty-eight years and had an amplitude of 7.1 diopters in the right eye, and of 8.3 in the left eye; 2 disks of homatropine and cocaine showed high compound hyperopia, right $+4.00 = +.75 \times 115$, left $+6.00 = +.25 \times 130$, to be present with a residual range of 3.7 diopters in the right eye and of 4.0 diopters in the left eye. More cycloplegic could possibly have been used with benefit, although marked error was found.

In this group the residual accommodative range should be below 3.0 diopters, with 2.5 as satisfactory. With an original accommodation of 5 diopters or less, 1 disk or 1 drop of homatropine will often suffice.

GROUP 4

In group 4 it is often difficult to judge the necessity for the use of a cycloplegic. With the original accommodation between 4 and 5 diopters, it seemed best to give a careful examination without a cycloplegic first. This determined the accommodative needs for lenses in near work. Then a weak cycloplegic can be used; 1 drop of 2 percent homatropine, to reduce the residual range below 3 diopters; here, any discrepancies in error should be revealed. This procedure might well be followed in questionable cases up to the age of fifty years. I have no objection to the use of a cycloplegic in the early stages of presbyopia, provided a careful examination without a cycloplegic is done first to

make sure of the requirements of the eyes in near vision. There is objection, however, to interfering with the accommodation by a cycloplegic before this has been done. The time varies in different individuals, before the accommodation returns to its original state (from several days to two weeks) after a cycloplegic has been employed. The patient may not be able to remain for observation or to return for a postcycloplegic test. The examiner must then guess the accommodative needs.

Case 60.—The patient was aged forty years and had the average amplitude for that age; 1 disk of homatropine and cocaine disclosed a hyperopic error, right $+ .75 = + .25 \times 145$, left $+ 1.00 = + .25 \times 180$, with a residual range of 4.0 diopters in the right eye, and 2.0 diopters in the left eye. Another disk reduced the residual range below 2 diopters but the error remained the same.

Case 61.—The patient was aged forty-one years and had a high amplitude of accommodation for this age, right 6.2 diopters, left 5.2 diopters; 1 disk of homatropine and cocaine showed a hyperopic error, right $+ .75 = + .75 \times 90$, left $+ .75 = + .75 \times 90$; the residual range was right 2.9 diopters and left 2.5 diopters. Satisfactory cycloplegia was obtained with one disk.

Case 62.—The patient was aged forty-three years and had a higher amplitude for the age than was observed in case 61, that is, right 5.5 diopters and

left 6.6 diopters; 2 disks of homatropine and cocaine revealed a compound myopic error, right $-.50 = -1.00 \times 180$, left $-1.25 = -1.25 \times 5$; the residual range was nearly 2 diopters.

Case 63.—The patient was aged forty-four years and had average amplitude, 4.7 diopters, for the age; examination without a cycloplegic showed a spherical error of $+1.00$ in each eye. The use of 1 disk of homatropine and cocaine reduced the residual range to 2.0 diopters, but less error was found, a sphere of $+ .75$. The cycloplegic appeared useless.

SUMMARY

The object of the paper is to plead for more intelligent and scientific use of cycloplegic drugs. The state of the patient's accommodation and not his age should determine the use of a cycloplegic. The accommodation should be studied as a routine in all cases before a cycloplegic is used.

Accurate data as to the effect of a drug on accommodation are obtained by measuring the residual accommodation. This information should govern the dosage.

From this study it would seem that the residual range, after a cycloplegic has been given, should be from 2 to 3 diopters, in order correctly to determine the refractive error, regardless of age. Further reduction seems unnecessary. Duane¹ placed this figure at less than 1 diopter.

The Mayo Clinic.

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NOTES, CASES, INSTRUMENTS

MOLLUSCUM CONTAGIOSUM

RAMON CASTROVIEJO, M.D.
CHICAGO

B. R., forty-five years of age, came to the clinic with the history that four months previously she had noticed a wart on the lower lid of the right eye; she had squeezed it and forced out a whitish substance. The wart did not increase in size, and lately three other warts have appeared.

Examination. Four small, lobulated, tumor-like growths were observed at the edge of the right lower lid; they



Molluscum contagiosum (Castroviejo).

were outside the eyelashes and about 10 mm. from the medial canthus. Two of these formations were pedunculated and the other two had broad insertions; the diameter of each was from three to four mm. The tumors were umbilicated in the center, and upon squeezing one of them a whitish substance was expressed. Otherwise the eye was normal and all other structures were normal. Clinical diagnosis: Molluscum contagiosum.

The patient was advised to have the tumors removed, and the operation was performed on August sixteenth. The

growths were dissected out, fixed in formalin and imbedded in celloidin; they were sectioned and then stained with hematoxylin and eosin.

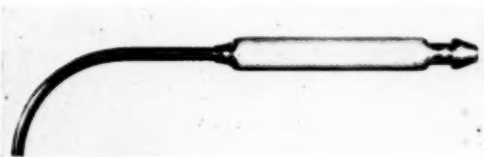
The microscopic examination showed a lobulated formation of glandular appearance. The specimen was surrounded by a capsule of connective tissue from which septa originated (see illustration); these were directed toward the center of the structure and divided it into several lobules. In contact with the inner surface of the capsule are epithelial cells which have undergone hyaline degeneration from the periphery toward the center; these form small ovoid and very refringent bodies that fall down into a central cavity where the white secretion is accumulated and which can be forced out by squeezing.

231 West Washington street.

BLOOD SUCTION CANNULA FOR USE IN LACRIMAL SAC SURGERY*

DANIEL B. KIRBY, M.D.
NEW YORK

This device is simply an application of the principle long used by nasal surgeons for removal of blood from the operative field. The only excuse for devising a special cannula for this purpose for lacrimal sac surgery was to have one which seemed to be particularly adapted in size and shape. The instrument which was designed in 1929 con-



Blood suction cannula for use in lacrimal sac surgery.

* Presented before the Eye Section, New York Academy of Medicine.

sists simply of a curved metal cannula with 4 mm. bore with blunt tip that can be adapted to any suction machine or line.

Since using the apparatus, there has been found a report by de St. Martin¹ of Toulouse describing the advantages of this method of removing blood in

lacrimal sac surgery and also a reference by Spaeth² to a glass cannula devised for this purpose by Major A. E. Schlanser, M.C.U.S.A.

The model was made by E. B. Meyrowitz Company. The photographic reproduction is reduced about one-half.
30 West Fifty-ninth street.

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SOCIETY PROCEEDINGS

Edited by DR. H. ROMMEL HILDRETH

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

February 10, 1931

DR. J. A. HUGHES, chairman

Choroidal detachment after cataract extraction

DR. E. C. ELLETT reported the case of Mrs. R., aged sixty-one years, who, after observation for three years, was operated on for a mature cataract in the left eye on December 6, 1930. The eye was a normal eye with a mature cataract, vision was light perception; tension was 22 mm., pupillary response active, projection slow in nasal half of field and conjunctiva normal. All teeth were out.

After the insertion of a corneal stitch, the corneal incision was made, and for the first time in many years the operator had cut the stitch with the knife. The lens was dislocated after grasping the capsule with capsule forceps, and the lens was extracted in the capsule. A peripheral iridectomy was then made. There was no vitreous loss nor any complication. The wound closed, and after a normal convalescence the patient went home on the seventh day. On the eleventh day the anterior chamber was found to be very shallow. On the eighteenth day the eye was examined with the ophthalmoscope for the first time since operation and multiple choroidal detachments found, the superior part of the field alone escaping, as is usual. The anterior chamber was empty and the eye a little soft. Twenty-five days after operation the vision was 6/15 with glasses. On the fortieth postoperative day the detachments were less, lighter in color, with visible vessels more like retinal detachment. The anterior chamber was still shallow. On the fiftieth day the chamber was deep, iris tremulous, choroid reattached. The vision improved. On February fourth, two days short of two

months after operation, the vision was normal with glasses. At the macula a dumb-bell shaped, pigmented figure was seen, lying horizontally. It was about one disc diameter in length. At the extreme periphery, in the last visible part of the fundus in a band about two disc diameters wide, were pigmented stripes or lines which resembled angioid streaks but were of black pigment, lying behind and in general at right angles to the retinal vessels. These lesions, as well as the disc, were plainly seen with a plus 12 D. sphere.

Iritis spongiosa

DR. E. C. ELLETT reported on a woman aged fifty years, whose refraction had been tested because of headaches and presbyopia several times in the last fifteen years, and who had never shown any eye trouble except a small refractive error. Her last visit was in January, 1930, at which time her vision was perfect with a low minus cylinder before each eye.

On May 21, 1930, she complained of violent pain in the right eye. She was seen the next morning, at which time there was found edema of the right upper lid, especially at the inner canthus. The eye was white, but there was some chemosis of the conjunctiva with lacrimation but no discharge. The pupil was active, cornea did not stain, fundus was normal, vision not impaired. On the 23rd the lid was less swollen, the bulbar chemosis greater, and all that day the pain was great, especially on moving the eye. There was slight protrusion of the eye. A diagnosis of tenonitis was made.

Beginning the next day plastic iritis developed with hazy cornea, diminished vision, and normal tension. Chemosis increased while pain lessened, the exudate became blood-stained, rising to the upper pupillary border. In ten days the condition had subsided permitting good vision. A

similar condition arose in the left eye seven days after onset in the right. The external signs were less severe but glaucosan was required to dilate the pupil.

While in the hospital the temperature reached 102 degrees and the white blood cell count 13,000. The Wassermann test and a blood culture were negative. The sinuses were normal. Two abscessed teeth were removed. Temporarily albumen and casts appeared in the urine. Treatment included morphine and hyoscin, atropin, dionin, glaucosan, salicylates, milk injections, hot applications, mercury by inunction and by the mouth, with potassium iodide.

The redness, conjunctival edema, protrusion of the eye, and pain on motion, with an active pupil, normal vision, and normal iris, at first led to the erroneous diagnosis of tenonitis. But the appearance of the plastic exudate made certain a diagnosis of iritis spongiosa.

Discussion. DR. RYCHENER was impressed with the patient's complaint of a feeling of foreign body in the eye at the very onset of the attack. Although this was not an uncommon early symptom, it was difficult to make the patient believe that there was no foreign body present. Culture from the apices of the teeth removed showed streptococcus hemolyticus.

Bilateral coloboma of iris, lens, and choroid

DR. A. C. LEWIS reported the case of G. W., aged twenty-three years, whose vision on February 7th was limited to counting fingers at eight feet with O.D. and moving objects at six feet with O.S.

The right pupil was large, pear-shaped, with the smaller part downward. It appeared to be decentered, the iris being very wide above and narrow below. Pupillary action was sluggish and very limited. The left iris presented a typical "bridge coloboma" 2 mm. in diameter. This pupil was also decentered downward, but the sphincter was intact. Two millimeters below the

bridge there was a complete absence of iris tissue all the way to the ciliary body. The iris just above the pupil was atrophic and there was an absence of pigmentation for about 3 mm. No pupillary action was present.

Intraocular examination showed absence of the lower fifth of the right crystalline lens. It appeared as though smoothly cut across. A large coloboma of the choroid was present, extending down from the papilla and the macular area for about three disc diameters. In the left eye the lens was notched below, crescentic in form. This indentation was one millimeter in depth at its center. The vitreous was a thin cloudy fluid filled with small floating opacities, and this turbidity prevented a clear view of the fundus, but all the central part of the choroid (probably one-third of it) seemed to be absent.

The bilateral nature of this congenital anomaly was sufficiently rare to make it interesting.

Herpes zoster ophthalmicus, uveitis, secondary glaucoma, relieved by glaucosan

DR. PHIL M. LEWIS reported on D. B., white male aged forty-six years, first seen on November 9, 1930, complaining of pain and discomfort of the right eye and a breaking out on the right side of the face of about ten days duration.

Examination revealed the typical appearance of herpes zoster ophthalmicus, and a very red, sore eye. Ciliary injection was marked, the cornea was very hazy, and the tension was 48 mm. Schiøtz. The pupil was dilated and did not react. Vision was 10/200.

Eserin, dionin, and hot compresses were used, but the condition showed no particular change until the third day after the first treatment, when four drops of levoglaucosan were instilled. This reduced the tension to 23 mm. before the patient left the office. His pain was relieved and his vision immediately improved to 20/70. Numerous fine deposits were noticed for the first time on Descemet's membrane. They had probably been obscured previously by the corneal edema.

Search for the usual causes of uveitis revealed nothing but a chronic tonsillar infection. Removal of tonsils was advised but the operation was not done. The eye continued to improve; the tension never went up again and vision was practically normal. However, two months after the attack the patient still had slight redness and a few dark brown deposits on Descemet's membrane. He had the characteristic pitting of the skin from the herpes.

Discussion. DR. R. O. RYCHENER remarked on the value of glaucosan in certain types of secondary glaucoma, especially in those following iritis with posterior adhesions. In his hands it had often secured early control of an otherwise resistant condition.

Hole in macula

DR. R. O. RYCHENER exhibited J.W.M., aged sixty-nine years, following simple intracapsular cataract extraction with stab iridotomy in each eye. Vision before operation was O.D. moving objects, O.S. 4/60, no view of the fundi being obtainable. Light projection was rather imperfect and a guarded prognosis was given. Following extraction a pigmented lesion very much like a hole in each macula was discovered. Refraction ten days after operation improved the vision to 3/60 O.D., 6/15 O.S.

Total unilateral ophthalmoplegia

DR. R. O. RYCHENER presented C. M., colored female aged forty-five years, with complete internal and external right-sided ophthalmoplegia, except for very slight movement in the line of action of the superior oblique, which had come on sixteen months previously, accompanied by severe pain in the right side of head and loss of sensation over that side of the head and face including the right half of the tongue. Four years previously pain and swelling had developed in the right side of the neck and lower jaw, lasting three months. Ever since then there had been massive enlargements of the lymph glands on both sides of the neck.

Vision O.D. was 6/30 to 6/12 improved by plus 1.00 D. sphere; the pupil was inactive to all stimuli, while the fundus showed no abnormality save slight enlargement of the retinal veins. The left eye was normal in every way, with vision of 6/6.

Serological tests of the blood and spinal fluid were negative. The blood hemoglobin was 93 percent, erythrocytes 4,900,000, leucocytes 9,700, differential count normal. The urine showed a slight reduction to copper solution but the blood sugar was 0.09 percent. X-rays of the head, sinuses, and chest revealed no pathology.

Biopsies of lymph glands from both sides of the neck revealed metastatic carcinoma into tuberculous lymph glands. The origin of the carcinoma was not suggested by the metastatic pattern. It was assumed that a similar metastasis had occurred at the sphenoidal fissure, which would account for the loss of function of all nerve structures passing through the fissure. No surgical procedure was contemplated.

R. O. Rychener,
Secretary

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

February 13, 1931

MR. ELMORE BREWERTON, president

Episcleritis due to focal sepsis

MR. A. F. MACCALLAN showed a man whom he had seen on December twenty-second with episcleritis in the right eye which had begun on December fifteenth. He had had the same condition in the left eye off and on for twelve years. There was also an old iritis. No changes were to be seen in the fundus. The man had been examined by a dentist and a throat surgeon. The former removed five bad teeth, and the rhinologist punctured the antrum, which yielded pus. There was still a good deal of sepsis in the antrum, and the tonsils and the ethmoid cells also

were infected. In a week's time these conditions were to be treated.

Shrunk stump of eyeball

MR. M. S. MAYOU reported the sequel of the case of a man who had iridocyclitis in one eye, and on the other side a shrunk stump which looked as if it followed a Mules operation. He had been in Moorfields Eye Hospital six months before but no operation had been done. Since then the stump of the eye had been removed and examined microscopically. The edges of the sclera were doubled in, and in the sections iridocyclitis was seen in the anterior part of the globe. In the posterior part was a melanotic sarcoma, which Mr. Mayou exhibited. The growth arising from the choroid was of comparatively recent origin, with no cell degeneration.

Opacity of the cornea

MR. J. D. CARDELL presented a woman, with negative family history, in whom both corneas showed a number of greyish-white opacities, chiefly in the center. Confluent patches in places gave a snow-flake appearance. The surfaces of the corneas were normally smooth and the fundi were normal. There was mixed astigmatism. Right vision was 6/18, left 6/36 slightly improved by glasses. Some excellent stereoscopic photographs of the case were shown. The speaker thought the condition was a hyaline degeneration of the cornea.

Discussion. MR. HAROLD GRIMSDALE said he had shown a similar case two years ago, which he had been watching twenty years. The man had 6/15 vision. He was bothered by the roughness of his corneas. Antiseptic ointment was the only thing used. The speaker did not think any treatment improved the opacities.

Retinitis proliferans complicated by retinal detachment

MR. J. H. TAGGART presented the case of a man aged sixty-eight years who complained of having seen black spots in the left eye for two months. His right fundus was found to be very ar-

teriosclerotic, with numerous punctate hemorrhages and small exudates. The condition seemed to be an early stage of retinitis proliferans. In the left eye the usual anatomical landmarks were almost obliterated.

Discussion. MR. ELMORE BREWERTON considered that the primary cause of the trouble was vascular disease.

Macular hemorrhage

MR. EUGENE WOLFF showed a woman aged seventy-eight years with a macular hemorrhage in the right eye, and in the left a senile macular exudative retinitis. In May, 1929, she gave a history of central scotoma in the left eye, of sudden onset. By August of that year she had developed the condition of which the exhibitor showed a drawing. There was a typical large whitish, slightly raised area in the macular region, with outlying black and white rays. A fortnight ago there was an extensive hemorrhage in the right eye. This condition might be, and had been, mistaken for new growth. Mr. Devonport had suggested that the condition was probably due to a hemorrhage into the internuclear layer.

Discussion. MR. M. HEPBURN thought these cases were generally choroidal in origin.

MR. J. H. FISHER considered it impossible that this hemorrhage was primarily intraretinal; he thought it was subretinal, between retina and choroid. There was no conspicuous atrophy of any fibers of the optic nerve in its temporal half.

MR. RAYNER BATTEN spoke of a case, having the same appearance, which he had watched for many years. The fine retinal vessels in the macular region seemed to be covered by clear fluid.

MR. HUMPHREY NEAME thought the pathological evidence was strongly in favor of the hemorrhage being retinal in origin, but that it passed through into the subretinal space.

MR. R. A. GREEVES suggested that the hemorrhages were not necessarily a feature of these cases. Sometimes one saw masses of exudate without hemorrhage.

Retrobulbar neuritis masked by choroiditis and due to latent sinusitis

MISS ROSA FORD reported on a woman aged forty years, who in 1923 had complained of headache and blindness. Field defects suggested a retrobulbar neuritis, and not choroidal patches that were present, as the cause for blindness. The sinuses were treated medically because of headache even though the examination was negative. There was definite improvement in vision from 6/12 and 6/60 to 6/6 and 6/24, and relief from headache.

Two important points emerged. The first was that behind the obvious choroiditis lay hidden an unsuspected and more dangerous retrobulbar neuritis. The second was the prompt response to drainage of the sinuses and the permanence of the result. The speaker's diagnosis of the prime cause was based on having seen other cases in which contracted visual fields were an accompaniment of nasal sepsis. Moreover, the pain was a confirmatory feature, for neither retrobulbar neuritis nor choroiditis caused pain, whereas sinusitis did.

It was remarkable that in this case all the usual signs of sinusitis were absent, so that even rhinologists did not diagnose the condition. When skiagrams cast suspicion on the right antrum, washings-out of this resulted in clear fluid being returned.

As a result of her study of this case Miss Ford considered that the diagnosis of closed sinusitis must be gone into and properly worked out in such cases. The scotometer was a valuable diagnostic help.

Discussion. MR. RAYNER BATTEN said this patient had been under his care for several years and he congratulated Miss Ford on her diagnosis. The retrobulbar neuritis could be considered as proved and to have arisen from sinusitis. When rhinologists failed to detect the condition what was the ophthalmologist to do? The paper should be read before rhinologists.

MR. RANSOM PICKARD said that in cases of this kind the rhinologist's report was often negative because he thought that if there was no pain there

was not likely to be an infection of the sinus.

MISS FORD said that her experience with reports of rhinologists in these cases was similar to that of Mr. Pickard. The nose had been packed with six inches of gauze soaked in equal parts of glycerine and water to which was added ten percent argyrol. This was kept in the nose three to five hours daily.

Recurrent vascular keratitis of unknown origin

DR. J. H. DOGGART read a paper on a series of twelve patients who were suffering from recurrent corneal attacks in which the formation of superficial new vessels was the chief feature, and yet the patients seemed to be free from the usual causes of such formation of new vessels: that is, phlyctenular disease, trachoma, acne rosacea keratitis, and trichiasis. The ages of these patients ranged from eighteen to sixty-two years, and though three of the seven male patients had long worked in a dusty atmosphere and several had bad teeth, no definite constant occupational factor was to be noted. Of the women, one had long-standing polyarticular arthritis and another had had a number of complaints including cholecystitis, gastric ulcer, and mastoiditis.

In four of the cases the trouble began with a marginal ulcer of the cornea, and in five others there were preceding attacks of conjunctivitis. In three cases there was keratitis without ulceration at first, though all had ulceration at some stage. A long interval elapsed before implication of the second eye.

The cornea was seen to be invaded by superficial vessels round its whole circumference. In the absence of ulceration the pain was not severe. The vessels never became so attenuated as to resemble the fine strands remaining after long-past interstitial keratitis or trachomatous pannus. With each attack there was a creeping of the vessels nearer the center of the cornea. In three cases calcareous changes oc-

curred; one showed a superficial deposit of crystals. The surface of the cornea was always somewhat roughened owing to the large size of the vessels and their superficial situation. In advanced cases the cornea lost some of its sensitiveness.

In the diagnosis the various conditions already named must be excluded, and the cornea must be examined to exclude sclerosing keratitis. Acne rosacea might cause confusion when in that condition the cornea was involved before the skin rash appeared.

The results of treatment Dr. Doggart had found to be disappointing. Though ordinary methods caused the ulcers to heal fairly readily, and though a nonulcerative attack could be somewhat relieved by the wearing of dark glasses and by mild lotions, it was only a question of time before a relapse occurred. In three cases there was no history of any trauma to the eye.

As to causation, the Wassermann was negative in the cases in which the test was done. The contents of the conjunctival sac of one patient revealed at different times the following organisms: bacillus xerosis, staphylococcus albus and aureus, pneumococcus, and streptococcus. But the real cause was unknown. He had seen a middle-aged man with recurrent vascular keratitis which occurred some time after naphthalene burns of the eyes, and his condition had closely resembled that of these cases. Mustard-gas burns of the eyes which at first seemed to be of only moderate severity later caused severe relapsing keratitis with much new-vessel formation.

Discussion. THE PRESIDENT asked whether in these cases Dr. Doggart had ever tried the effect of the old-fashioned operation of peritomy. As this was a bilateral condition the operation could be tried on one eye, the other being kept as a control.

MR. RANSOM PICKARD said he had had a case of relapsing keratitis in which he did peritomy on one of the eyes, and he believed it produced some benefit, but not so much as he had expected.

(Reported by H. Dickinson.)

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section of Ophthalmology

November 20, 1930

DR. H. MAXWELL LANGDON presiding

Emergency ophthalmic kit

DR. EDWARD A. SHUMWAY showed this outfit for ophthalmic examinations and treatments away from the office or hospital. A stock physician's bag had been fitted with a rack holding six small bottles for ophthalmic solutions and had additional provision for holding a cotton container, solutions of boric acid, etc., and would also hold dressings and instruments. The bag could be obtained through Wall and Ochs.

Trachoma in wrestlers

DR. ZENTMAYER reported a case of recent unilateral trachoma in a wrestler, formerly an athletic coach.

The late Drs. Patton and Gifford had reported eight cases in wrestlers and Dr. Patton had believed the mode of transmission to be from the massaging of the eye by the opponent. Dr. Zentmayer felt it wise to recall this mode of infection that it might be brought to the notice of health authorities.

Discussion. DR. MANN spoke of two wrestlers whom he had recently seen. The first had developed a conjunctivitis following a physical examination, apparently by contamination from the examiner's hands. This did not prove to be trachoma however.

The other case had had trachoma for several years. This man named several other wrestlers who had trachoma. The head being on the dusty floor seemed to explain the frequency of conjunctivitis.

DR. M. E. SMUKLER mentioned the case of a world champion wrestler with unilateral trachoma that was reported to the Bureau of Health. He disappeared for six months during which time the lid was rolled and treated and the patient discharged as cured. Examination by the Bureau of Health showed no active inflammation nor discharge and he was allowed to continue wrestling.

DR. MAXWELL HERMAN commended

Dr. Zentmayer's report and said that professional wrestlers themselves had coined the term "wrestlers sore eyes."

He then told of two undoubted cases in wrestlers he had seen lately. One, a man with a college education, had pointed out the needlessness of such infection. The culprits were usually foreigners but as champions their popularity made protest difficult.

Prescription of glasses

DR. ALFRED COWAN read a paper in which he urged the ophthalmologist to incorporate in his profession the style and shape, as well as the effective power, of the lenses he desired. The paper will be published in full in the American Journal of Ophthalmology.

Discussion. DR. SIDNEY L. OLSHO said that in convex spherical meniscus lenses up to plus eight, the minus six inside curve was constant and the spherical lenses were so supplied without any trouble by all optical shops. Also convex, plane, cylinder, toric lenses had a constant minus six inside curve. But when a convex, toric, sphero cylinder was to be ground the front surface remained plus six combined with the cylinder, and the spherical effect was obtained by diminishing the minus of the inside surface instead of increasing the convexity of the front surface.

The objections to this method had been stated. Why was it persisted in? Was it not common knowledge that a constant minus six inside curve for powers up to plus eight would provide a more efficient and wider angle lens? The answer was that it was easier. When toric, sphero cylinder lenses superseded the flat forms they came to be ground almost universally, for commercial reasons, with a constant plus six, front surface, base curve. Throughout the country the optical shops now had this set-up; they had the tools, they had the lens blanks and they had the habit.

To change to a constant minus six inside base curve for convex sphero cylinder toric lenses up to plus eight as suggested by the speaker was not a simple matter but meant revolutionary

changes, the purchase of hundreds of new blanks and tools and an unanimous discarding of the somewhat faulty but rapid method in vogue.

Instead of taking a single step forward the national manufacturers had gone many steps farther by making point focal lenses universally available at only a slight advance over the present prices of ordinary toric lenses. This had been brought about by production on a huge scale and standardization.

True it was, that some of the claims made for these lenses had been exaggerated but it could not be denied that they were of great advantage, particularly in the higher foci. They did afford a wider angle of efficiency than lenses less well balanced. Furthermore the polish of these lenses was much finer.

This advance, all along the line, in lens designing and lens marketing would be delayed for many years were the commercial incentive to the manufacturers not present. The low price of the toric lenses we now used was dependent upon the mass production of lens blanks and molds by the same national manufacturers. In the bifocal field we were using proprietary types without giving the matter a thought.

The several concerns marketing point-focal lenses employed distinguished scientists to work out the best possible curve combinations. They followed in general the teachings of Tscherning. The results were not ideally perfect. There were commercial and technical limitations.

The speaker wanted to return for a few moments to the discussion of toric lenses. Some of the larger optical shops had the tools not only to grind lenses with a plus six base front curve but also with plus three and plus nine base curves. This increased the range in which these opticians could operate in an attempt to equalize inside curves of an unequal lens pair. It also afforded at times, a means of approaching the most efficient relation of inside and outside curve. Then, by transposing, as had been pointed out by the speaker, we might often secure more efficient combinations. He said he wished to point

out that these surfacing specifications often involved special and costly grinding. A real point-focal lens would in many instances be less costly and perhaps better.

In the several point-focal series of lenses the surfacing problems had been worked out more or less in advance. This helped those not familiar with the juggling of base curves and transpositions. The point-focal lens might not be ideal but the error would be fractional. He doubted whether a specially surfaced ordinary toric lens would be more perfect. If a lens requiring unusual surfacing must be replaced in any but the original shop, the chance of not receiving the identical surfacing was great. A standardized lens was more apt to be replaced without error.

DR. GEORGE S. CRAMPTON said that in Philadelphia they were particularly blessed with guardian angels in the way of most wonderful opticians and that he did not believe there was another city in the country in which the oculists were so well guarded by opticians who did beautiful work. He understood that in Chicago there was only one retail concern that did not refract, while here there were hordes of them.

Dr. Crampton said further that Dr. Cowan's paper covered the subject thoroughly, and the question of going into more figures was quite uncalled for, but that it made us stop and think, however, and quite rightly, that oculists should not depend on the opticians. Their cases might go to opticians who would take care of these transactions to the best advantage of the patients, but this was not always so. We knew that frequently our prescriptions fell into the hands of inferior opticians, and these patients received the sort of compounds which were almost "poisonous" as Dr. Cowan pointed out.

He felt that this paper was very timely, and that it was for them to think more seriously of this matter, and not be in the position of a man to whom he had been talking, who said when asked "How do you prescribe your lenses?" answered "All toric." "What about the spheres?" "Toric also,

everything toric." Dr. Cowan's paper also lead one to think of possible slips in the writing of actual prescriptions. A simple form was best.

Dr. Cowan had spoken of three and nine base curves as being more expensive, about \$1.00 a lens more. Some oculists specified curves or went into great detail and showed that they knew the whole optical side of the question. Others were less careful. Some gave the size of the bifocal segment, and others left it to the optician. Some gave the center for both the distance lens and the bifocal segment. As far as writing the prisms was concerned, that was fairly uniform, as they usually used the little triangle, and afterwards gave the base. Some had a printed blank. As was known, the English oculists, and a good many in this country, depended on the little circle showing the axis. He said that he thought that started when foreign opticians did not know our system, and it was better to mark the axis on prescriptions.

Modified La Grange operation

DR. J. MILTON GRISCOM presented the steps of this operation, which he first used in November 1929, as follows: a broad conjunctival flap, including the episcleral tissues, beginning eight to ten millimeters from the upper limbus was dissected down to the corneal margin. While the flap was turned down over the cornea by an assistant, the point of a keratome was entered in the sclera two and one half millimeters behind the scleral margin of the cornea. As soon as the point penetrated the sclera the conjunctival flap was turned upwards; the keratome was pushed forward on a plane with the posterior surface of the cornea until the assistant looking from below, saw the point emerge in the anterior chamber. With the anterior surface of the iris as a guide, the keratome was then further introduced into the anterior chamber until the incision in the sclera was about five millimeters wide, following which the instrument was quickly withdrawn. The anterior lip of the scleral section was then seized with an iris

forceps and an elliptical piece of sclera one millimeter wide and three millimeters long excised with a pair of small curved scissors. This was followed by a broad, complete, basal iridectomy. The conjunctival flap was replaced and sutured.

Discussion. DR. B. F. BAER stated that he did this identical operation for the first time in December 1929. Owing to the extreme shallowness of the anterior chamber encountered in many glaucomatous patients, the procedure required modification because of the inability to use the keratome safely. In those eyes with extremely shallow chambers, an incision was made with a Graefe knife and the sclera slightly bevelled just before the completion of the section.

During the past 11 months, some 28 or 30 eyes had been operated on by one or other of these methods, with a subsequent rise in tension in two eyes. The tension had been easily controlled by again resorting to miotics.

In none of the cases had mild iritis been observed nor was there further lowering of central vision nor peripheral fields. The operation had been extremely satisfactory and far less dangerous than LaGrange's operation. In no case had prolapse of the vitreous or ciliary body been encountered.

DR. DE SCHWEINITZ said that shortly after David Priestley Smith, seventeen years ago, had published his technic, to which Dr. Baer referred, the speaker had adopted a procedure much less complicated, being in fact, one which was precisely similar to that which Dr. Griscom had described, and in all instances (always cases of chronic glaucoma) the results had been eminently satisfactory, though it must be admitted that the operations had been few in number.

About a year ago he had suggested to his associate, Dr. Baer, a return to this method of operating, and the results, as the Section had heard, were entirely satisfactory. In no case was there a failure to secure an adequate fistulous area, although in two cases there had been a return of increased tension, quickly controlled by miotics; quiet

iritis had not developed in any of the operated eyes, and in none of them had there been a dangerous lowering of intraocular tension.

It was interesting, he said, that two surgeons operating in the same hospital had been unconscious of the fact that they were utilizing an exactly similar technique.

Naturally, considerable additional experience with this modified LaGrange procedure would be necessary before its permanent value could be established.

DR. SHANNON said that the modified LaGrange operation, as suggested by Dr. Griscom, appealed strongly to him by reason of its simplicity. The classic LaGrange operation always presented the danger of cutting into the ciliary body in completing the section. This modified procedure, however, obviated to a great extent this danger. Some operators made the scleral section with the keratome before dissecting down the conjunctival flap. This to his mind, accentuated the risk of introducing the knife beneath the iris, an accident that recently happened to a skillful operator.

He further stated that he would be inclined to try the operation at the earliest opportunity.

DR. GEORGE H. CROSS said he had never tried the modification of the LaGrange operation as suggested by Dr. Griscom, as the results in his last 15 cases were satisfactory. These were all operated on with the Ridley cataract knife, the sharp point permitting one to enter a very shallow anterior chamber and make the scleral section.

Bacteriological and immunological aspects of iritis, especially the relation to bacterial allergy

DR. JOHN A. KOLMER, by invitation, read a paper on this subject in which attention was drawn to the lack of acceptable data on the etiology of chronic recurrent iritis associated with focal infection and a plea was made for more systematized bacteriological investigations in this disease.

Iritis of exogenous origin as well as tuberculous and syphilitic iritis might

be regarded as well established from the etiologiical standpoint, but the iritis of focal infection still required a great deal of investigation for ascertaining the exact mechanism of infection.

The opinion was expressed that chronic recurrent iritis was probably a streptococcus infection in the majority of instances with some cases due to the gonococcus, staphylococcus, pneumococcus and other organisms.

The occurrence of streptococcus iritis secondary to primary streptococcus infection in the tonsils, apices of teeth, etc., did not necessarily involve acquired selective affinity of the organisms for the iris although the experimental production of iritis among rabbits by intravenous injections of broth cultures of streptococci from such primary foci, strongly suggested this possibility.

It was probable that toxins elaborated in primary foci might be responsible for iritis rather than the bacteria themselves and an experimental method for studying this phase of the problem was outlined.

Attention was drawn to the points of resemblance between iritis and acute and chronic arthritis of streptococcus origin with the possibility of iritis being due to acquired allergic sensitization of the iris to streptococcus toxins.

It was suggested that autogenous vaccine therapy be employed routinely in the treatment of chronic recurrent iritis when streptococci, staphylococci or pneumococci were recovered in cultures of probable primary foci, as removal or drainage of primary foci alone might not result in recovery.

In view of the possibility and probability of iritis being due in whole or part to toxins it was suggested that vaccines contain the soluble or exogenous toxins in addition to heat or chemically killed organisms.

Discussion. DR. EDWARD A. SHUMWAY said that as a point of practical value in the treatment of iritis due to focal infections in various parts of the body and especially those in the prostate, while gonococcal vaccine injections were most valuable where gonococcus was present in the secretion after mas-

sage of the prostate, many cases were found in which there were no gonococci and only a mixed type of ordinary pus organisms. Such patients according to urological specialists were quite common and in them an autogenous vaccine was indicated.

After administration either of the gonococcal vaccine, or of one prepared from the pus organisms present, the treatment should be followed by injection of one of the milk preparations which would give a good nonspecific protein reaction. Such a case had been under his care recently and this method had been followed with marked success, with a perfect visual result.

A. G. FEWELL,
Secretary.

LOS ANGELES COUNTY MEDICAL ASSOCIATION

Eye and Ear Section

March 2, 1931

DR. A. RAY IRVINE, president

Zonular opacity of the cornea

DR. M. F. WEYMANN presented a patient aged seventy-five years, who had had progressive loss of vision in both eyes for over three years. For ten years there had been trichiasis of the left eye, which had been treated by pulling out offending lashes. In the right eye, where visual acuity was 20/150, there was a complicated immature cataract. In the left eye, with an acuity of fingers at four feet, there was a zonular opacity of the cornea in the pupillary area. With the biomicroscope this was seen to be a superficial amorphous film which contained the circular, clear spots peculiar to this condition. The lens appeared fairly clear although it was not well seen. On January 28, 1931, the opacity was removed by means of a blunt curette. Three days later epithelialization was complete and on February 2, 1931, with a -1.50 D. sphere the visual acuity was 20/60 plus. To date the cornea had remained clear and had presented a smooth surface. Central senile fundus changes caused some lowered acuity, but with correc-

tion the patient was able to read newspaper print.

Removal of a similar but thicker opacity from a patient eighty-seven years old only improved vision from hand motions to 20/196.

Discussion. DR. HAROLD WHALMAN stated that he had removed a zonular opacity of the secondary type from the eye of a middle-aged man who had had repeated attacks of iritis. The visual acuity was improved by the operation from counting fingers to 20/70. In this case the opacity was brittle and cracked off like eggshell.

DR. REINA stated that he had had under his care a case of corneal ulcer associated with zonular opacity.

DR. JULIAN DOW inquired whether there was any loss of sensation in the cornea which had been operated on.

DR. WEYMANN replied that no test for hypesthesia had been made but that lashes could still be felt when they rubbed the cornea. The thicker type of opacity was removed by blunt dissection with an iris spatula.

Denver postgraduate meeting

DR. WALLACE MILLER gave a very enthusiastic report on his experiences in the postgraduate course in ophthalmology which is held at Denver each year. Particular emphasis was laid upon the hospitality accorded the visiting physicians.

The rhinological aspects of retrobulbar neuritis

DR. HAROLD A. FLETCHER of San Francisco, by the aid of lantern slides, pointed out the great number of variations in size, shape, and extent of the posterior nasal sinuses. The topographical anatomy of the posterior nasal sinuses and their relation to the orbit, optic canal, and optic commisure was discussed. Other lantern slides showed the blood supply, the nerve supply, and the lymphatic drainage of these regions. It was shown that the posterior ethmoid or sphenoid of one side might be in relation to the optic nerve of the opposite side in rare cases of retrobulbar neuritis. After a brief review of the theoretical path-

ways for infection and toxins to reach the optic nerve from disease of the nasal sinuses, the speaker concluded that in the absence of nasal findings in these cases, and if the ophthalmologist had worked up the case conscientiously, it was the duty of the rhinologist to operate on these regions without undue loss of time.

Discussion. DR. GEORGE MCCOY stated that the use of the Walker screen was so easy that there was no excuse for overlooking these cases of retrobulbar neuritis. The pathological lesion was often an interstitial neuritis. In the acute form early treatment was necessary. Frequently there was no visible pathological change in a sinus until it was curetted. In the chronic form of retrobulbar neuritis, which was of long duration, one had more time to work out suitable treatment. Tobacco amblyopia was an example of the chronic type.

DR. CLIFFORD WALKER said that the etiology of retrobulbar neuritis was a subject of much dispute. In Europe, multiple sclerosis was the outstanding etiological factor recorded and only one and one-half percent of the cases were attributed to nasal origin. Much time must be devoted to study of the visual fields and careful records must be kept with the hope of solving the problem in the future. Careful field studies avoided confusion with Leber's disease and intracranial conditions. Very few cases were reported in which the optic nerve could actually be demonstrated to have been exposed in a sinus. The condition behaved very much like an infection. In apparently unilateral cases careful field studies should be made on the unaffected eye. The papillomacular bundle was not always first affected, as peripheral contraction might occur first. Cases of suspected multiple sclerosis must be followed many years to fix the diagnosis. Acute cases might be unnecessarily operated on due to the alarm of the oculist. Large doses of sodium salicylate were indicated as a therapeutic measure.

DR. THEODORE LYSTER said that ten or fifteen years ago there had been more inclination to operate on the sinuses

than at present. The correct attitude now was not to be too hasty with nasal surgery.

DR. SIMON JESBERG reported the case of a patient in whom both eyes were involved in an optic neuritis. Although no pathological changes were found, the process remained stationary, with vision of 20/100 after opening the ethmoids and sphenoids. Another patient had a unilateral retrobulbar neuritis with a purulent antrum infection. The speaker suggested that the infrequency of retrobulbar neuritis in children was due to their lack of sinus development.

DR. GEORGE MCCOY said that his idea of retrobulbar neuritis meant an involvement of the papillomacular bundle with central scotoma. He asked how peripheral contractions of the field could be placed in this class.

DR. WALKER answered that, in addition to classic retrobulbar neuritis with central scotoma, chiasmal lesions and peripheral affections of the nerve were often placed under the classification of retrobulbar neuritis where visual acuity or field changes were present without demonstrable fundus-changes.

DR. WALLACE MILLER stated that he had found leukocytic extract recommended as a therapeutic agent in retrobulbar neuritis.

DR. HAROLD FLETCHER, in closing, said that the ophthalmologist must decide as to when surgical intervention by the rhinologist was necessary. He thought, with Dr. Jesberg, that the infrequency of the condition in children was due to their lack of sinus development.

M. F. WEYMANN,
Recorder.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

March 10, 1931

DR. T. E. LEATHERWOOD presiding

Pseudoglioma

DR. R. O. RYCHENER exhibited B. J., male aged nine years, with a pseudoglioma of the left eye. Some three weeks previously the parents had noted

a tendency of the left eye toward convergence and occasionally had seen a white reflex from the pupil, but it was only a week before that defective vision had been discovered. When seen on March 5, 1931, vision was O.D. 6/6; O.S. light perception in nasal field only. The right eye was normal in every way. The left eye externally was normal except for a dilated and fixed pupil. A white reflex was easily observed from the pupil and with the ophthalmoscope a white lardaceous mass projected anteriorly from the disc and the macular region, entirely obliterating them. A semicircular tongue ran from the mass upward, nasally, and anteriorly to the periphery of the fundus. A spray of tiny vertical capillaries lay immediately over the disc area, best seen with a +8.00 D. sphere. The tongue projected forward to a depth best seen with a +12.00 D. sphere. Far up and out a normal fundus reflex was seen with several retinal vessels visible until they disappeared under the edge of the gray mass. No hemorrhage or vessels other than those over the disc were noted. The mass transilluminated in every direction. The tension (Schiotz) was O.D. 16, O.S. 8. Because of the absence of hemorrhages, newly formed vessels, and increased tension a diagnosis of pseudoglioma was made.

Discussion. DR. P. M. LEWIS wondered about a preëxisting period of fever. During a recent meningitis epidemic he had seen many such intraocular metastases, some in which the patients were so mildly ill that the true meningeal condition was overlooked.

DR. J. B. STANFORD thought the diagnosis was correct.

DR. RYCHENER stated that no history of illness or trauma to the eye had been obtained.

Identical twins with hyperopia, amblyopia ex anopsia, and colloid deposits in optic discs

DR. R. O. RYCHENER presented female identical twins, aged sixteen years, who had been wearing optician's corrections for some years but had remained out of school the past term because of headaches and ocular discomfort. Examina-

tion under homatropin confirmed by retinoscopy showed a compound hyperopic astigmatism with normal vision in each right eye, amblyopia in each left. The refraction of the two girls was as follows: (1) O.D. 6/30, +1.25 D. sph. +0.75 cyl. ax. $90^\circ = 6/5$; O.S. 1/60, +2.50 D. sph. +0.50 cyl. ax. $90^\circ = 2/60$; (2) O.D. 6/60, +2.00 D. sph. +0.50 cyl. ax. $90^\circ = 6/5$; O.S. 2/60, +2.50 D. sph. +0.50 cyl. ax. $90^\circ = 6/30$.

In the first girl the left eye diverged ten degrees under cover and there was no binocular vision. In the second girl, binocular vision was present with an esophoria of four degrees.

The fundus examinations were entirely normal with the exception of all four optic discs, which showed a high central branching of the vessels and a profuse colloid deposit beneath them entirely covering all other landmarks of the disc and projecting slightly beyond the normal disc limits, with an elevation of 3 to 4 D. above the retina.

Discussion. DR. A. C. LEWIS wondered whether the colloid deposit had any pathological significance.

DR. P. M. LEWIS asked whether the blind spots were enlarged.

DR. RYCHENER thought the deposit a congenital anomaly without any pathological significance, having personally followed many such cases without ever noting any change in the condition. The blind spots, which were yet to be measured, would undoubtedly be found to be enlarged because of the extent of the deposit beyond normal disc limits.

Alcohol injections for severe blepharospasm

DR. PHIL M. LEWIS reported the case of K. J., female aged seventy years, first seen in May, 1930, complaining that her eyelids closed whenever she was exposed to bright light. This had been going on for several years but had become much worse during the past few months.

Examination revealed that she had a spasmodic contraction of the orbicularis and other muscles of the face supplied by the upper branches of the facial nerve. It became much worse on

exposure to bright light or on attempting to examine the globes. No cause was found to account for the condition. Proper glasses, drops, and the usual routine treatment caused no improvement.

The patient disappeared for several months and on returning she was no better. An injection of 2 c.c. of eighty percent alcohol (recommended by Saffar, *Zeitschrift für Augenheilkunde*, 1930, v. 71, p. 135) preceded by procaine was made along the upper, outer, and lower orbital borders, similar to the Van Lint method of injection before cataract extraction. Considerable reaction occurred, which subsided in about seven days. Great improvement was noticed. Certain fibers however still had a spasmodic contraction, requiring another small injection.

The patient was completely relieved of her blepharospasm. This seemed to be the easiest and best method of controlling this condition.

R. O. Rychener,
Secretary

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

November 17, 1930

DR. HILLIARD WOOD presiding

Unilateral hydrophthalmos

DR. HERSCHEL EZELL reported the case of Mrs. R. G. P., aged 28 years who had consulted him on October 24, 1930, on account of a greatly enlarged, protruding and blind left eye which was quite painful. The eye had been defective since birth.

The protrusion measured nearly one inch. The cornea was 25 mm. in diameter and opaque in the central two-thirds. The anterior chamber was deep; an opaque tremulous lens was behind an iris not clearly seen. No view of the fundus was possible. Tension was not taken for fear of rupturing the globe.

After enucleation the eye measured 40 mm. in its antero-posterior diame-

ter; 29 mm. at the equator and 25 mm. across the cornea.

DR. J. S. FRIEDENWALD reported that the specimen showed no canal of Schlemm, thinning and stretching of the tissues and a thickened ciliary nerve resembling a neurofibroma.

H. C. SMITH,
Secretary.

KANSAS CITY SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

March 19, 1931

DR. A. E. EUBANK presiding

Operation versus medication in chronic glaucoma

DR. GEORGE F. SUKER of Chicago, by invitation, discussed this subject following an operative demonstration of cyclodialysis combined with iridencleisis. He stated that no one treatment or operation could be used in every case of glaucoma, but that once a glaucoma always a glaucoma and that the care was a life long affair. Further he said that the disease always left some sequel and that it was not purely an ocular disease but part of a general pathology. He believed that every case was operative but that the time for operation was not the same for each type. Many cases began as an optic atrophy and regardless of what was done went on to blindness. He thought that every case in the beginning should be a medical case. The diagnosis of early glaucoma was very difficult and frequent field taking was necessary. It often resembled meningitis. Although there was no glaucoma without increased tension one should not wait for increased tension in diagnosing the case. The patient should sit an hour or two in a dark room and then be brought into the light and if the tension varied it was very suggestive. Also, the cardio-vascular system should be investigated as well as possible auto-intoxications. He believed glaucoma

was closely connected with pathology in the sympathetic nervous system. In the medical treatment the time of medication must be varied. It was a good plan to instill drops on awakening and in the afternoon, and it was essential that they be instilled just before bedtime. The patient should be instructed to sit in the sunlight but should not use the accommodation. A careful refraction was important as well as proper hygiene. The time to operate was whenever the fields of vision became markedly constricted for some time or when the constriction was increasing or if Roenne's or Seidel's sign did not disappear under medical treatment. Glaucoman had no place in treatment of chronic simple glaucoma. If the color fields were disturbed there was an associated optic atrophy.

The choice of operation depended on the types of the disease. The choice must be based on the anatomical solution. Through the suprachoroidal space was the only way of obtaining drainage and the modern trend was toward a filtration operation. In order to keep the wound from healing firmly there must be uveal tissue in the pathway of the section. This was easily obtained either with the deep root iridectomy or a cyclo-dialysis combined with the inclusion of the iris. During the operation it was important to avoid mental shock. Preparation of the patient consisted in using no miotic from 12 to 24 hours before the operation. The patient was prepared as for any major operation. The operative field was treated with 1:3000 bichloride solution from one to two minutes. A thick conjunctival flap should be secured and the iris must not be caught under the conjunctiva. After the operation atropine should be instilled and later according to the case one might use miotics. It was important that all foci of infection be removed before operation.

ALVIN J. BAER,
Recorder.

AMERICAN JOURNAL OF OPHTHALMOLOGY

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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THE CHANGE OF EDITORSHIP

In assuming the editorship of the Journal it is the desire of the new editor that there shall be as little departure as possible from the routine conduct of the Journal. He agrees with the policies of the former editors and desires to make no radical changes. He has ideas of his own but no wish to disturb the well established order.

It is impossible to undertake the responsibility of the editorship without some hesitation. To attempt to occupy the chair vacated by Dr. Jackson and Dr. Crisp would be presumption were it not for the assurance that they would continue as active contributors and consultants. Each of these men gave unstintingly of his time, Dr. Jackson for ten years and Dr. Crisp for three and one-half, for little reward except the satisfaction of giving the ophthalmologists of the country a Journal which has always been representative of their interests. To tell the profession what these editors have done is unnecessary

but few realize that the editorship has demanded fully half their time.

It is our hope that the American Journal of Ophthalmology may be made increasingly valuable to our profession. Not only shall we continue to publish the best original articles available but also through the other departments shall endeavor, as heretofore, to establish and maintain as many contacts with our colleagues as possible. An opportunity for written expression in reports of less than major interest is given in the Society Proceedings; another department is available for correspondence of any character, especially for the report of new methods or new instruments.

We have the double function of serving both reader and writer. Whereas most editors feel that their obligation is entirely to the reader we believe that we have another important function to fulfill in aiding the beginner in journalism by encouragement and suggestion and by the publication of his con-

tributions whenever possible. It is true that the incentive to contribute to the literature has been greatly augmented by the desire of universities and clinics that their staffs shall produce written results and their willingness to reward the man who writes frequently. Nevertheless there are those who really have something worth telling who are discouraged by rejection of their first efforts at publication, without explanation or suggestion. We shall continue to give aid and encouragement to these.

Not all of our readers realize that the Abstract Section is by far the most complete published in the English language, in that it contains abstracts of more than ninety-five per cent of all articles in the literature pertaining to our specialty and that the Index in the December number of the Journal is the most satisfactory place for finding references to all ophthalmological articles that have been published during the year. Dr. Crisp has personally conducted this department while editor-in-chief and has consented to continue it under the new régime. His willingness to do this, together with the assurance of the co-operation of the other members of the editorial board has led the new editor to feel that it is possible for him to carry on the work so ably done by others before him. But in addition to their help he earnestly solicits for the future the loyal support which the ophthalmic profession has given the Journal in the past.

Lawrence T. Post.

OPHTHALMIC EDUCATION AN INTERNATIONAL PROBLEM

Education has two main purposes, to render the individual more effective as a competitor and as a co-operator in his social environment. This twin fact applies as definitely to medical education as to education for other walks and purposes of life, for the physician or surgeon occupies this dual position in society, as a co-operator and as a competitor. If he is inadequately educated, either during his undergraduate course or subsequently, he is not only insufficiently equipped to co-operate in the struggle to prevent, cure, or alleviate

disease, but he is also at the same time less likely, other things being equal, to prevail in competition with his colleagues for that share of public support which will give him professional success and the economic reward which accompanies it. More or less exceptionally, he may win a greater share of public favor than that to which his professional ability properly entitles him; and in this case, although the physician may be an economic success, the public loss is shared by some professional colleagues whose real excellence is overshadowed by his display of false values.

If physicians as a group, whether in general medicine or in a special branch of medicine, are inadequately trained, the principal loss is to the public, which is less efficiently cared for and protected. The responsibility for remedying such a state of affairs rests jointly upon the profession and upon the public, but measures for improving medical education are undertaken chiefly at the instigation of those more enlightened physicians and surgeons who are ahead of their times both as to understanding and as to interest in the common weal.

If among the practitioners of any medical specialty there is a deficiency in average level of education, or even if any considerable number of such practitioners are scantily trained for their work, then it is necessary and proper to attempt improvement in standards of special education.

Organization to this end may move along two main lines. Either better educational facilities may be provided and the individual encouraged to avail himself of such facilities; or the claim to practice the specialty may be prohibited by law in the case of those who fail to prove that they possess the necessary training. Those who believe the former of these two methods to be adequate attach great value to the force of public opinion, inside and outside the profession, in setting up a sort of persuasion which may take the place of actual compulsion.

The contention that a diploma or license in general medicine and surgery carries within itself sufficient evidence

of the owner's competence to practice any department of medicine or surgery, or that it is unfair to require a medical graduate to obtain further legal recognition of his competence, is considered by some to be illogical, but will die hard. That contention is based upon conservatism, upon a limited conception of public rights and professional responsibilities, or an unwillingness to disturb what is more or less frankly regarded as vested professional interest.

The agitations for improvement of special training, on the one hand, and for more or less compulsory special licensure, on the other hand, have shown marked acceleration within the past decade, and it was natural and proper that they should receive special attention at the International Ophthalmological Congress in Amsterdam. By resolution of that congress, a committee consisting of Walter R. Parker of Detroit and Carl Lindner of Vienna was appointed to study the whole problem of the practice and teaching of ophthalmology. Both members of the committee, by their experience and interest in ophthalmological education, are peculiarly well adapted for the task before them.

The committee has planned a detailed inquiry into ophthalmic licensure and education in the various civilized countries of the world. Naturally they have found it necessary to enlist the services of collaborators in this task. The first fruit of the inquiry was recently published (*Archives d'Ophthalmologie*, 1931, volume 48, page 125) by Professor H. Villard of the University of Montpellier, France, who was invited by the committee to furnish a report on the practice and teaching of ophthalmology in the European countries of Latin tongue, that is to say in Belgium, France, Italy, Portugal, Roumania, and Spain.

Villard's report is based in turn upon information furnished by Professors Coppez and Danis of Belgium, Marquez of Spain, Ovio and Duranti of Italy, Gama Pinto of Portugal, and Michail of Roumania, as well as by several French colleagues.

The title of ophthalmologist ("méde-

cin-ophthalmogiste" is the title employed in France) has not yet been recognized by law in Belgium, France, Portugal, or Spain; but has received such recognition in Italy and Roumania. In Italy this legal recognition dates from the end of the year 1923, while in Roumania the law was not passed until June, 1930.

But France does possess something resembling the semiofficial recognition of special qualification which exists in Germany and Austria. In the two German countries, where social insurance has become so general, no one can be accepted by the insurance organizations as an ophthalmologist unless he has given proof of definite qualification in the specialty.

In France the great majority of ophthalmologists belong to the "Syndicat des Oculistes français," an organization created for professional defence and not for scientific purposes, but the statutes of which require, in addition to the national diploma of "docteur en médecine," proof of a course of at least two years in official or private ophthalmological clinics. The public therefore knows that every member of the "Syndicat" has been recognized as possessing proper qualifications. Unfortunately the statutes of the syndicate do not demand an examination.

For the benefit of those who are particularly interested in the problem of undergraduate teaching of ophthalmology, it may be said that Villard devotes a good deal of space to discussion of such teaching as encountered in the romance countries. In this connection, since there may be some who will read this editorial but will not have studied previously the paper by O'Brien on ophthalmic education which appeared in our April issue, it may be well to call attention to the thoroughness with which the combined problem of undergraduate and postgraduate education in our specialty was presented in that article. The advanced position as to requirement of a supplemental diploma was well argued in a letter from Shastid which was printed on page 261 of our March issue.

The Bulletin of the Belgian Academy

of Medicine has at different times recorded very interesting discussions of the problem of special qualification in Belgium. (See American Journal of Ophthalmology, 1930, volume 13, page 1009.) The proposal to demand a supplemental license in ophthalmology has been repudiated several times in Belgium, but the fact that the proposal has strong support and is an active question is illustrated by the appearance of two papers bearing on the subject in the minutes of the sixty-first meeting of the Belgian Ophthalmological Society. One by Gaudissart and Van Lint is entitled "How, at Philadelphia, ophthalmology is taught to physicians"; and the other by Van der Straeten, "Teaching and development of ophthalmology in Belgium, with regard to the plan for the creation of a course in ophthalmology (special doctorate)."

Gaudissart and Van Lint carefully study the Philadelphia scheme in an essay of seven pages. Van Lint is strongly in favor of a special doctorate in Belgium, while Van der Straeten, in a long paper, puts forward the opposite view.

There can be no question that more or less official requirement of definite qualifications in a specialty will react toward the creation of better facilities for the necessary education. Such a process has already been effective in this country as a result of the existence of the American Board for Ophthalmic Examinations and of the fact that the certificate of this Board has been required for membership in certain national and local ophthalmological organizations. In France, the beneficent reaction from the requirement for membership in the "Syndicat des Oculistes français" may be seen in the rather rapid development of well organized postgraduate courses ("cours de perfectionnement"). It will be a long time before finality is reached as to either legal requirements or educational facilities. But, alike in national and international gatherings, the entire problem should be discussed carefully and frequently, remembering that, when all is said and done, the well being of the general public is of paramount importance.

W. H. Crisp.

TREATMENT OF CONICAL CORNEA

In the Oxford Ophthalmological Congress for 1930, Dr. T. Harrison Butler made this statement: "Twenty years ago I operated upon a few patients, but more recently the cases that have come under my notice have been fitted with strong cylinders with considerable improvement in vision, and there was no question of an operation. Probably, like chlorosis, conical cornea depends upon defective hygienic conditions; lack of sunshine and fresh air, a diet deficient in vitamins, and tight-lacing." (Transactions Ophthalmological Society of the United Kingdom, vol. L, p. 551).

Some years ago Dr. George E. de Schweinitz said: "I have never operated for conical cornea." This exactly expressed the experience and attitude of the writer; whose disposition and conclusions have been confirmed by cases, including those briefly outlined below. Cases occur from time to time, that may seem to justify resort to operative treatment, but their subsequent history, generally, shows a better result by avoiding operation on the cornea.

A girl of 15 years, with 1.25 D. of mixed astigmatism and standard vision in each eye, had some pericorneal hyperemia and phlyctenular conjunctivitis. She was put on yellow ointment and forbidden sweets; and was not seen again for five years. She returned with the left eye showing 10 D. of corneal astigmatism; and the best corrected vision of 8/100. She went elsewhere for treatment; and had the left eye operated on, and removed, within six months. The right had then no increase of astigmatism and full vision. Four years after that, when she returned for treatment, the right eye had developed conical cornea, with best vision of 6/100. She was put on miotics, and measures to improve her general health. There was little change in her eye, or general health, until two years later, at the age of 28 years, gastroenterostomy was done for "stomach trouble". After that she gained 25 pounds weight, and the eye became quiet, giving no trouble in the six years following. But vision was not improved above 5/100.

A young man was first seen at the age of 19 years, with conical cornea in each eye, requiring:

R.—15 sph.—8. cyl. ax. 25° V.=4/30

L.—10 sph.—5. cyl. ax. 20° V.=4/30

He was put on miotics and care in the use of his eyes was ordered. He completed high school, went through college, studied law, and took up teaching. His eyes often became hyperemic, and the corneas hazy and ulcerated, but under treatment useful vision was maintained. At the age of 31 years he had repeated thyroid operations, after which his health, both general and ocular, was markedly improved. At the age of 36 years, Dr. D. H. O'Rourke fitted him with contact glasses, giving vision of 5/10 in each eye. At the age of 39 years his glasses still give him the best vision he has had since he was 19 years old; and he can wear a contact glass all day.

Risley recognized a division of myopia into two classes, anterior myopia and posterior. The latter is the kind associated with posterior staphyloma, and the inflammatory changes in and about the optic disc. It depends upon thinning and distension of the sclera, arising with excessive convergence. The "anterior myopia" is due to changes of its curves, and distension of the cornea. It reaches its highest degrees in conical cornea; although not confined to that one form of anterior distension of the eyeball. The treatment of conical cornea and ordinary myopia have much in common. Optical correction, moderation in near work for the eyes, and attention to the general nutrition of the body, are needed in all cases of both classes; and sometimes periods of complete rest of the eyes under cycloplegia.

But for conical cornea there is also need to test the vision and refraction with a small pupil. When the pupil is dilated in a dark room, even without a mydriatic, it may reach 6 or 7 mm. diameter, and in conical cornea there are great variations of refraction, in different parts of the pupil. A 2 mm. pupil, under pilocarpin, gave best vision with —8. sph.—6 cyl. ax. 140° . When dilated to 6 mm. the best vision was secured with +3. sph.—4.50 cyl. ax. 15° .

The suggestion of the late James Wallace of Philadelphia, that pilocarpin should be used to contract the pupil, when testing for lenses required for optical correction, in cases of conical cornea, was one of much practical value. It has been known, and used by some Philadelphia ophthalmologists, for nearly fifty years.

In thus testing the refraction subjectively, a record should be kept of the size of the pupil when each test was being made. Repeated tests will give an idea of the exact size of the pupil most favorable for securing the best vision in each eye affected with keratoconus. By control of illumination, and the use of a proper solution of pilocarpin, the patient will sometimes be able to utilize his best vision for eye work. In general it is secured by a small pupil; and this is the state present for best vision with normal eyes.

The pupil is contracted in strong light for far seeing; and for near work with the effort of convergence, made when looking at close subjects. Pilocarpin may be used to get the small pupil, without excessive convergence. Children with high hyperopia sometimes hold the book close to the eyes, to get this advantage of a small pupil. This may help some eyes with high hyperopia to become less hyperopic. When it is done by an eye with a hazy cornea, or high astigmatism, regular or irregular, it often causes the eye to become myopic.

Pilocarpin may also help in conical cornea, by keeping down the intraocular tension. Its influence in this direction is widely known and often resorted to for the non-operative treatment of glaucoma. It should be tried in the recent cases of conical cornea that seem to be progressive. It may even be of service in some cases of progressive "posterior myopia". But in them mydriatics, with temporary abstinence from any near work, are generally better.

So many medical students become affected with an ambition to become great operative surgeons, and so many of these never wholly recover a properly balanced judgment; that the non-opera-

tive treatment of conical cornea could hardly be expected to have a persistent, fair trial. The results of operation are soon manifest. If favorable they are placed on record, where all may read. If unfavorable they are forgotten, as soon as possible. The deliberate judgment of men of such large and long experience, and such good observers, as George E. de Schweinitz and T. Harrison Butler should be borne in mind, and emphasized. Perhaps if the thermophore had been as persistently and widely tried as the cautery, it too, would have helped to show the superiority of non-operative treatment for conical cornea. *Edward Jackson.*

BOOK NOTICES

Nursing in diseases of the eye, ear, nose, and throat, as practised at the Manhattan Eye, Ear, Nose, and Throat Hospital, New York City. By Harmon Smith, M.D., Editor, and nine other authors. Fifth Edition, thoroughly revised. 338 pages, 72 illustrations. Philadelphia and London, W. B. Saunders Company, 1931. Cloth, \$2.25.

The authors, realizing that a nurse's training in a hospital caring for a restricted group of patients is apt to lack perspective, have added several chapters to broaden the book. Nowadays, however, such nurses are usually given courses in many branches and are sent to general hospitals for supplementary training. To the reviewer's mind, therefore, it seems highly debatable whether the chapters on the germ theory of disease and on the feeding and care of infants, and other such material in the first part of the book, will appeal to most eye, ear, nose, and throat teachers. What special conditions, diseases, and complications to expect in children, for example, interstitial keratitis, would be more to the point.

It is quite evident that the authors, especially of the section on the eye, are trying to teach the technique of nursing and a little about the diseases treated. The discussions of methods used are admirable; the descriptions of

the anatomy and physiology of various parts are excellent, and the actions of drugs are well explained. After these beautiful descriptions of the anatomy of a part it would seem logical, however, to add a few words to show how each malformation or malfunction can and does cause certain of the commoner diseases. For example, after a lucid description of the lens nothing is said about cataract, so that as the book stands one could go through it and not find even a definition of cataract. Among other conditions not defined are pterygium, glaucoma, iritis, nystagmus, chalazion, polyp, and sty. It has been the experience of the reviewer that nurses are very much interested in knowing what they are nursing, so that they may more intelligently do the nursing.

The many excellent illustrations are a very pleasing feature. The drawings of the instruments are particularly helpful to a nurse.

The mentioning of refraction and the need for cycloplegia is commendable. The relation to strabismus should be included. A sentence about the extreme advisability of a child's refraction being tested under cycloplegia just as soon as a squint develops at any age would serve to get many such cases to a physician earlier, for many people pay a great deal of attention to advice given by a nurse.

This book is evidently suited to the needs of the hospital for which it is intended and for graduate nurses who already know something about the different diseases, but the section of the book devoted to the eye could, in the reviewer's opinion, be improved as a textbook for the average student nurse by such deletions and insertions as are suggested above. *Ralph W. Danielson.*

Sur le strabisme alternant (On alternating strabismus). By Pierre Dupuy-Dutemps, assistant at the Clinique des Quinze Vingts, etc. Paper covers, 97 pages, illustrated. Price not given. Published by Amédée Le-grand, Paris.

This very interesting monograph consists of a historical discussion of alternating strabismus, a description of its various types, methods of diagnosis, pathogenesis, treatment, and reports of forty-three individual cases in detail.

There are two types of alternating strabismus recognized by the writer. The first is that with relation to distance, which is caused by anisometropia and in which the hyperopic eye fixes for distance, while the myopic eye fixes for near. The second is classed as alternating strabismus according to direction. In it each eye has about an equal error of refraction and equal visual acuity. This type may be divergent or convergent.

In this second type of alternating strabismus the patient does not fix indiscriminately with either eye, but there is a definite rule for the determination of fixation. In the convergent type, when an object is passed horizontally from right to left it is first fixed by the right eye; then by the left upon passing the line of the nasal bridge which limits the left field; again by the right eye on passing the midline of the visual fields; and finally by the left eye as the nasal bridge obstructs vision of the right eye. In the divergent type the right eye fixes in the right half of the field, while the left eye fixes in the left half.

Fusion cannot be developed in these individuals and the treatment is purely surgical. It is recommended that operation be done at twelve or thirteen years of age, using the utmost care to avoid overcorrection.

One case of alternating vertical strabismus is described as an unusual finding.

A large percentage of the patients were emmetropic and for the most part the errors of refraction found were negligible. Visual acuity must be equal in each eye, otherwise the better eye is used for fixation and the strabismus is no longer alternating.

The style of this monograph is very simple and clear-cut, while presenting all of the necessary information on the subject. It may well serve as an ex-

ample to those who would offer scientific facts in an interesting manner.

M. F. Weymann.

Ophthalmological Society of the United Kingdom, Transactions for 1930.
Cloth, Octavo, 1,000 pages, 8 plates, 1 in colors, 123 illustrations in text.
London, J. and A. Churchill, 1931.

This is volume fifty of the Transactions of the Ophthalmological Society; and gives the proceedings of its Jubilee Meeting, held in London, April 3, 4, and 5, 1930. It is the largest volume of annual transactions the society has ever published; and it contains about as much scientific matter as was contained in the two volumes, that included the transactions of the Convention of English-speaking ophthalmological societies held in 1925. It contains, in addition to those of the Jubilee Meeting, the proceedings of four affiliated Societies, The Oxford Congress, the Midland, The North of England and the Irish Ophthalmological Societies.

Such a volume causes the reader, living in the Western United States, or one of the less thickly populated parts of the British Empire, to appreciate the advantages of being where so many scientific gatherings are possible. Yet a large part of these advantages are accessible through this volume. No one living in Great Britain could attend all these meetings; and the reader of the volume has the proceedings of all before him in their best form, and always accessible when wanted.

This volume may show the scattered ophthalmologists of the newest and the oldest countries, the lines along which they must develop their activities, if they are to understand and practice modern ophthalmology. Surplus copies have doubtless been printed. We hope that the supply will be quickly exhausted, and that readers of this Journal will get a good share of them. The demand for them will stimulate the printing of larger editions of the Society's transactions, since they record so well the latest thought on the prac-

tical problems that confront alert, well trained practitioners of ophthalmology.

The Presidential address of this meeting by Leslie Paton, was devoted to "Some of the Factors Controlling the Position and Movements of the Eyes." Mr. Paton put it forward as an abstract of what he had written for the occasion, but which was too long to read. Its 20 pages, with illustrations, deal mainly with the part played by the labyrinth and the proprioceptive impulses from the neck muscles. These are important, although they do not rise to the level of consciousness reached by retinal control. This address deals with facts determined by laboratory work, but basic to understanding of ocular movements.

The Bowman Lecture, by Sir Arthur Keith, is entitled "The Genius of William Bowman." It begins with his personality, which Keith thinks was the secret of the high regard felt for Bowman by his contemporaries. This is, as the President stated, truly a Memorial Lecture; but it gives an intimate view both of the man and of his times. Following the Bowman Lecture, forty-five pages are devoted to "Disorders of Secretion of Endocrine Glands" by J. Herbert Fisher, W. C. Souter and Professors Hugh MacLean and E. C. Dodds. Their papers touch on the high points and possible influences of such disorders, in ophthalmology.

The bulk of the papers are grouped under the usual headings and have the practical bearings that have made this series of transactions so important. Under Comparative Anatomy Ida C. Mann describes "The Reptilian Iris." Treacher Collins, under Pathology discusses the "Harderian Gland"; that appears with the third eyelid in air breathing animals, but disappears among the higher mammals, to be replaced by the lacrimal apparatus and the mucin gland cells of the conjunctiva. He finds that these protective mechanisms are impaired by diet lacking in fat-soluble vitamin A, which causes keratomalacia. Prof. Van der Hoeve of Utrecht gives thirty pages to the relations of the eye and amnion bands. Fred Ripley reports an experimental investigation into the

intraocular pressure and drainage of the aqueous humor.

The Oxford Ophthalmological Congress furnished an equally important series of papers, beginning with three on toxic amblyopias, by Traquair of Edinburgh, Sir Farquhar Buzzard of London, and J. A. Gunn, Professor of Pharmacology at Oxford. Sir Oliver Lodge lectured on Modern Theories on the Nature of Light; and Professor Arthur Schueller on recent developments in radiology. The Doyne Memorial Lecture, 75 pages, was by Dr. Harry Friedenwald, of Baltimore, on "Pathological Changes in Retinal Blood Vessels in Arterio-sclerosis and Hypertension." With 5 plates, 13 illustrations in the text and a bibliography of 12 pages, this constitutes an interesting and practical monograph upon a subject of immediate and general interest. Following this comes a 20 page article on Detachment of the Retina and its Treatment by Prof. Jules Gonin. There is a paper on Keratoconus Posticus by T. Harrison Butler, one on Interstitial Keratitis and Workmen's Compensation by T. L. de Courcy, and one on Hypopyon Recidivans by J. A. Van Heuven, of Utrecht.

The Midland Ophthalmological Society, from its five meetings, gives 12 practical papers and case reports. The longest, of 7 pages, is by T. Harrison Butler on Ophthalmic School Clinics. From the North of England Ophthalmological Society, holding 6 meetings, have come 24 case reports and communications. From the Irish Ophthalmological Society, meeting at Cork and Belfast, come 10 communications.

There is a nine page index for this volume; and following this the "general Index" of these transactions, for the ten years, 1921-1930, covering 262 pages. These thorough indexes, covering such an enormous number of clear, brief communications on practical subjects pertaining to every department of ophthalmology, make this series of transactions the most valuable series of reference books the ophthalmologist can find in any language.

Edward Jackson.

Zur kritischen Würdigung der plastischen Stumpfbildungsmethoden (Critical evaluation of plastic methods of stump formation). By Dr. Heinrich Schmidt. 38 pages, 4 illustrations in text. Price 2.50 marks. Verlag von S. Karger, Berlin, 1930.

Twenty years ago the author described a method of implantation after visceration, using cattle bone from which all the organic matter had been removed by a prolonged heating process. He now reports again on the five patients whose cases were previously recorded, and whose prostheses had remained in place for periods varying from twenty-two to thirty years at the time of last examination. Four roentgen curves made at the time of the last examination show perfectly characteristic bone shadows corresponding to the spherical prothesis. The fifth patient could not be persuaded to submit himself to roentgenography.

The literature of implantation is carefully reviewed. The author describes the method of preparation of the bone implant as follows: The head of the cattle femur is freed from fat by repeated boiling. Without using the cartilaginous covering, the bone is sawed into not more than four cubes measuring fifteen to eighteen millimeters on the side. The cubes are turned into spheres of varying diameter. (For adults a diameter of fifteen millimeters is to be recommended.) Three or four spheres are suspended in a wire basket, at first about thirty centimeters above the small flame of a Bunsen burner. Gradually the remaining fat is driven off, the spheres become black, and develop a dirty gray and then a gray-white color. When the last shade of color is complete over the whole surface of the sphere, the wire basket is lowered about five or six centimeters. The longer the process takes the better the result; about two or three hours should be required. Finally the flame is allowed to play around the spheres for a few minutes, and the spheres are slowly cooled by gradually raising the basket to the original height. Immedi-

ately before operation the sphere is again "flamed" and cooled and then moistened with physiological salt solution. (Accidentally delayed in publication.)

W. H. Crisp.

OBITUARY

J. A. Stucky

It was with the sincere regret that attends the loss of an old and tried friend that the shocking news of the recent death of Dr. J. A. Stucky in an automobile accident was received. The high lights in his professional life are



J. A. STUCKY

that he graduated in medicine from the University of Louisville in 1878, and practiced in Louisville and Lexington till his death. He was President of the American Laryngological, Rhinological and Otological Society in 1903, President of the American Academy of Ophthalmology and Oto-Laryngology in 1907, Chairman of the Section on Laryngology, Otology and Rhinology, American Medical Association in 1921,

President of the Kentucky State Medical Association in 1921, Chairman of the Section on Laryngology, Otology and Rhinology, Southern Medical Association in 1922. To ophthalmologists Dr. Stucky was best known for his work on trachoma in the mountains of Kentucky, which he first reported to the Academy of Ophthalmology and Oto-Laryngology in 1911. He made many trips to the mountains, conducting a traveling clinic, and was successful in interesting the Russell Sage Foundation, the Kentucky State Board of Health and the U. S. Public Health service, to the end that trachoma hospitals were established, and the incidence of this disease in Kentucky greatly lessened. Besides his clinical observation on the treatment and transmission of the disease, Dr. Stucky insisted that it be considered a deficiency disease, and by appropriate diet and hygienic living was able to secure excellent results from his treatment.

Dr. Stucky was best known for his work in Oto-Laryngology, to which field the greatest efforts of his long professional life were devoted. His contributions were many and valuable. He was a missionary with a message, which he delivered often and earnestly. He was a serious student, an earnest worker, a speaker of much force, and a man of great energy, which qualities have enabled him to leave his mark in his special field. His interest in sociol-

ogy was great, and on many occasions he delivered public addresses on a great variety of subjects, upon all of which he was interesting and helpful to his hearers.

To the many who knew Dr. Stucky personally, the loss extends further and deeper than that usually occasioned by the death of a professional friend. Though his late years were undoubtedly saddened by the death of his two grown sons, his energy and his interest in his profession and his friends was undiminished. Especially to his friends, in occasional letters, he showed a sentimental side of deep feeling. He was friendly and helpful to his colleagues, a choice and much beloved associate to his intimates, and an honor to his profession.

Edward C. Ellett.

ERRATA

In the paper by Horacio Ferrer on "Diffuse hyperostosis of the sphenoid with great enlargement of the anterior clinoid processes," appearing in the May issue, pages 412-416, figures two and five have been transposed, figure two actually showing hyperostosis of the frontal bone and figure five the sphenoidal hyperostosis.

In the last sentence of the abstract of Dr. A. I. Kendall and Dr. S. R. Gifford's paper in vol. 14, p. 178, on "Trachoma and avitaminosis" the word "no" should be substituted for the word "an."

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history

10. RETINA AND VITREOUS

Redslob, E. **Development of the vitreous body in the chick.** *Ann. d'Ocul.*, 1931, v. 168, Jan., pp. 29-44.

In the chick embryo the vitreous body develops from a basal membrane which is exclusively ectodermal, being elaborated by an intracellular substance condensing at the border of the ectoderm. In the interior of the cavity the membrane is resolved into a curtain of amorphous substance representing the first stage in the evolution of the vitreous body. At a certain stage the membrane detaches itself from the epithelial sheath, entering alone into the vitreous cavity, and continues to be resolved into amorphous substance. When it has finished its work a new membrane forms either at the retinal epithelial border or at the epithelial border of the lens, to form more of this substance.

Finally the membranes all disappear except one at the future site of the ciliary body. These successive steps the author feels explain the visible layers of the vitreous seen by the slit-lamp in the living eye. The development at the level of the embryonic cleft is also discussed. At no time do mesodermal elements enter into the cavity.

Redslob has never seen true fibers in the vitreous, only amorphous sub-

stance, although often agglutinated into a network as conjunctival secretion will do. Microscopically the vitreous shows no tissue characteristics, favoring the belief that it is a gel.

H. Rommel Hildreth.

Rochat, G. F. **Cerebral angioma in Lindau's (Hippel's) disease.** *Klin. M. f. Augenh.*, 1931, v. 86, Jan., p. 23.

The patient belonged to a family with Lindau's disease, reported by Tresling in volume 64 and Rochat in volume 67 of the same journal. He fell ill in 1919, at the age of twenty years, and presented symptoms of brain tumor, the eyes showing only bilateral choked disc. He died in 1930, and the autopsy revealed a cyst and two solid angiomas of the cerebellum and a large angioma of the left hemisphere of the brain, that is, the same histological picture as in angiomatosis of the retina. This case demonstrates that the angiomatosis in Lindau's disease need not be limited to retina, cerebellum, or spinal cord, but may also involve the brain.

C. Zimmermann.

Stein, Richard. **Heterotopy of the macula from cicatricial distortion of the retina after ignipuncture for detachment of the retina.** *Klin. M. f. Augenh.*, 1931, v. 86, Feb., p. 188.

The myopic right eye of a woman aged thirty years sustained through a fist blow a detachment of the retina with a large triangular gap. Vision was reduced to counting fingers at 40 cm. The gap was cauterized according to Gonin, with subsequent hemorrhage into the vitreous, impairing vision to light perception. The blood was absorbed within two months, vision was 1/24 with -10.00 sphere, but the patient complained of disagreeable diplopia. Examination of the vertical and horizontal double images showed that they could not be caused by a simple disturbance of the ocular muscles. The visual line of the right eye deviated five degrees in and fourteen degrees up from the ocular axis, and to the right eye all vertical and horizontal lines appeared inclined.

Ophthalmoscopically, delicate folds of the retina ran downward and outward, which must have been caused by a distortion of the retina upward and inward. The vessels coming from the disc at first downward and outward in their transit to the retina bent sharply to a horizontal direction over the original site of the fovea, whose area was now displaced two disc diameters upward and one-half disc diameter inward. Also the visual field showed displacement of the blind spot. The cause of the heterotopy was traction by the shrinking scar of cauterization. The peculiarity of the case lay in the displacement of the macula and the unusual combination of heterotopy of the macula with concomitant and paralytic strabismus.

The second patient, a woman aged forty-five years, with twenty-three diopters of myopia in the right eye, complained of diplopia after the lens was extracted within the capsule. Possibly the heterotopy had been previously compensated for by an abnormal position of the lens. C. Zimmermann.

Van Hoonacker. **Effects of extirpation of the carotid ganglion on the retinal circulation.** Bull. Soc. Belge d'Ophth., 1930, no. 61, p. 86.

The author has seen several such extirpations performed in the treatment of

epilepsy during the past few years. After operations on the periarterial sheath of the carotids or the vertebral arteries (internal sympathectomy) the author recognized regularly the syndrome of Claude Bernard-Horner, with miosis, enophthalmus, narrowing of the palpebral fissure, and ptosis—phenomena that changed but little or not at all with time. The pupil did not react to cocaine, but adrenalin instilled into the eye or injected back of the globe caused a mydriasis much more marked on the operated than on the normal side.

The author noted a fall of tension of 3 to 5 mm. (Schjötz) in about a dozen operated cases, most of them first examined the day after the operation. The same was true of the retinal tension, which fell about twelve units according to the ophthalmodynamometer of Baily. The author has never noted heterochromia iridis or retinal vasodilatation.

After extirpation of the carotid ganglion one obtains a rise of the retinal tension not only on the operated side but in both eyes. If in a second operation one removes the carotid ganglion of the opposite side the retinal tension rises still higher and on both sides. The effect is lasting. The increase is variable in different subjects.

To explain the persistence of the effects obtained by extirpation it is maintained that the carotid ganglion is a peripheral ganglion composed of nerve elements identical with the vascular ganglionic elements and is therefore an important center of vasomotor innervation. J. B. Thomas.

Verhoeff, F. H. **Microscopic observations in a case of retinitis pigmentosa.** Arch. of Ophth., 1931, v. 5, March, pp. 392-407.

The right eye of a man sixty-four years of age was removed because of acute tuberculous iritis. The patient had been blind for twenty years, presumably from retinitis pigmentosa. The left eye gave a typical ophthalmoscopic picture of retinitis pigmentosa; the fundus of the right eye could not be seen. The histological examination

showed no involvement of the fundus resulting from the tuberculous process. A careful description and many plates showing the pathological findings appear in the paper.

From the findings in this eye, the author concludes that the essential lesion is progressive degeneration of the retinal neuroepithelium, the rods being the first element affected. He feels that the changes in the pigment epithelium are secondary to those of the neuroepithelium, though this latter fact has not been conclusively demonstrated. The adventitia of the vessels becomes much thickened, resulting in a reduction in the lumen of the vessels. This adventitia is very transparent, and, therefore, not seen by the ophthalmoscope. The waxy appearance of the disc, characteristically seen, is due to gliosis rather than to optic atrophy. The posterior cortical cataract frequently noted as a concomitant of the disease is due to lack of nutrition following failure of the blood supply. A similar etiology may lie back of the glaucoma which occurs at times. The author does not feel that retinitis pigmentosa is primarily due to vascular or other changes in the choroid. The theory of abiotrophy explains the lesions observed, but should not be accepted until all other possibilities have been excluded. That light is a factor in etiology appears very unlikely. But serious consideration should be given to the possibility that disturbances in liver activity may underlie this condition. *M. H. Post.*

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Duggan, J. N., and Nanavati, B. P. **A case of quinine amblyopia with a central color scotoma of one eye and total blindness of the other.** *Brit. Jour. Ophth.*, 1931, v. 15, March, p. 164.

Five years previous to observation a woman aged twenty-five years had taken five ounces of quinine. Following a period of unconsciousness she was totally blind. Four months later she recovered her sight equally in each eye. Subsequently vision in the right eye failed. The left vision with -4.50 sph.

-1.00 cy. ax 70° equalled $6/12$. Both discs were atrophic, the blood vessels mere streaks. The left field was reduced to 20 degrees and showed a definite small central scotoma for green.

D. F. Harbridge.

Duggan, J. N., and Nanavati, B. P. **Two cases of quinine amblyopia with unusual ophthalmoscopic picture.** *Brit. Jour. Ophth.*, 1931, v. 15, March, p. 160.

This is the report of two cases with unusual ophthalmoscopic findings. A girl aged nine years took fifteen grains of quinine during a period of thirty-two hours. Blindness was sudden and total. The unusual feature was a marked retinal edema with normal discs and blood vessels. About one month later there was pallor of disc vessels, and fields contracted to twenty degrees. The same condition remained eleven months later. In the second case a male aged twenty years took 378 grains of quinine over a period of three weeks. Fundus appearance, later changes, and field contraction were similar to those of case one. Vision returned in two weeks to $6/6$.

D. F. Harbridge.

Favory, Albert. **Hemorrhage into the sheath of the optic nerve.** *Arch. d'Ophth.*, 1931, v. 48, Feb., p. 81.

The difficulty of diagnosis is emphasized, as is also the rarity of this condition. The symptoms are rather abrupt loss of vision and peripheral contraction of the field. These may be accompanied by papilledema and peripapillary hemorrhages. The condition usually ends in partial atrophy of the optic nerve, and there may be a black or brown pigment ring surrounding the papilla. This last finding is a classical sign of a preexisting hemorrhage into the meninges of the optic nerve. These hemorrhages are always secondary, either to trauma or meningitis. One case of each type is reported in detail. A third case of localized hematoma, which may be secondary to a tumor is described. There is a very complete review of the literature upon the subject and the differential diagnosis is discussed at great length.

M. F. Weymann.

Heuer, G. J., and Vail, D. T., Jr. **Chronic cisternal arachnoiditis producing symptoms of involvement of the optic nerves and chiasm.** Arch. of Ophth., 1931, v. 5, March, pp. 334-349.

The "chiasmal syndrome" of Cushing has for its characteristic clinical features visual disturbances, primary optic atrophy, and bitemporal visual field defects. A number of pathological conditions in addition to primary hypophyseal tumors which may be responsible for these pictures are suprasellar craniopharyngioma, suprasellar and parasellar meningioma, some of the gliomas, and certain suprasellar aneurisms in their earlier stages. To these may be added prechiasmal tumor of the optic nerve as described by Dandy, and chronic cisternal arachnoiditis. These two latter, however, show only primary optic atrophy and its concomitant constriction of the visual field. Primary optic atrophy alone, therefore, if no other etiology can be demonstrated, may be a positive indication for operation for relief of pressure on the optic nerves and chiasm. The neurosurgeon's experience is overwhelmingly in favor of the mechanical theory as to the cause of either primary or secondary optic atrophy. Statistics from various eye clinics show considerable variation in the etiology of optic atrophy. In all series there are two classifications under which cisternal arachnoiditis may be included, and which should be studied with this possibility in mind. They are the syphilitic and unclassified groups. Four cases of this condition are reported with good results following decompression by removing part of the thickened arachnoid.

Chronic arachnoiditis may be a localized or generalized process. The present paper deals only with lesions involving the region of the optic chiasm, which gives rise to thickening of the wall of the cisterna chiasmatis and to adhesions involving the optic chiasm and nerves. Except for Cushing, no writer has commented on this lesion with the syndrome which it presents, and on the necessity of operative intervention. No statistics with regard to

the frequency of this condition are known, but the authors regard it as relatively common. They found four instances in seventeen cases in Cincinnati. In twenty-four consecutive cases in Baltimore, other writers found none. Its connection with other diseases, such as Leber's disease, is suggested.

Nor is the etiology of the lesion well understood. The possibilities seem to fall under two headings, trauma or infection. In the four cases, the first was apparently trauma, the last encephalitis, and the other two were undetermined. The pathological picture is a thickening of the arachnoid forming the wall of the cisterna chiasmatis. The membrane becomes greyish and opalescent, instead of transparent and tough, and in three of the authors' cases it was distended by fluid. Frequently there is a mass of adhesions involving the arachnoid, lying between the dura, over the anterior border of the sella, and the chiasm, fixing the latter to the base of the skull. Adhesions may also involve the optic nerves from the chiasm to the optic foramen, attaching them to the basal dura. These adhesions may be stripped from the nerves without injury to them. It should be noted that in all cases operated on by the authors the local lesion was associated with a generalized process. The lesion does not destroy the sella. Vision may be lost very rapidly. Symptoms of Fröhlich's disease may be present.

M. H. Post.

Kuhn, H. S. **Hereditary optic atrophy:** Leber's disease. Arch. of Ophth., 1931, v. 5, March, pp. 408-417.

The condition known as Leber's disease may be defined as one in which there is rapid onset of blindness, coming on at different times in the two eyes and progressing to variable extent, with central scotoma, slight or absent concentric contraction, and fleeting evidence of mild neuritis, followed by secondary pallor. There is also a definite familial history. Such a case presented itself to the author, who found that his attention was called to the chiasmal

region by the "bilateral nature of the process, a tendency to a bilateral swing to the scotomas, the small closed over sella turcica, both in the patient and in his brother, the total absence of any systemic basis, glandular or infectious, and the mechanical factors involved." The findings were such as to suggest to the author some arachnoidal inflammation about the chiasm. He therefore referred the patient for an exploratory operation on this region. Other than a few slight adhesions, however, no definite pathology was found about the optic nerves. There was some temporary improvement in vision, but this began to fail after several months had passed. It was then decided to inject air into the ventricles for roentgenologic observation. This was done after draining off 126 c. c. of fluid. Air was seen to have filled the interpeduncular and posterior spaces. A considerable amount also was found over the surface of the brain. The sulci were not well outlined, however, and no air had entered the ventricles. It was thought that possibly the foramina of Luschka and Magendie were blocked by adhesions. A ventriculogram was determined upon, and for this purpose a hole was bored in the bone in the occipital region on either side, and air run through from side to side. The ventricles were then found dilated but in normal position. The third ventricle was regularly outlined. The only part of the system which was not seen by these two procedures was the fourth ventricle, but obstruction here did not seem indicated, because of the total lack of internal hydrocephalus which had been found at operation, and no pathological condition was seen in the region of the optic chiasm. At the final examination the vision remained somewhat better than previous to the first operation, but still greatly impaired. In conclusion, the author pleads for reports of all such cases, whether satisfactory or unsatisfactory in their results. The author feels that many cases temporarily improved, if watched for a sufficient length of time, will show regressions.

M. H. Post.

Reitzel, R. J. **Optic atrophy from lead poisoning.** Jour. Amer. Med. Assoc., 1931, v. 96, April 11, p. 1227.

Reitzel reports a case of bilateral primary optic atrophy in a nineteen months old negro baby, due to lead poisoning from chewing on a wooden porch railing covered with old dried pure lead paint. Convergent strabismus, muscular weakness, nuchal rigidity, absent knee jerks, increased spinal fluid pressure, and anemia were present. The urine and feces contained large amounts of lead, and the blood pressure showed marked basophilic stippling. On symptomatic treatment and a high calcium intake the general condition improved, but the optic atrophy progressed.

George H. Stine.

Rifat, A. **A case of optic atrophy without choked disc in a frontal lobe tumor complicated by ventricular hydrocephaly.** Ann. d'Ocul., 1931, v. 168, March, pp. 206-212.

The patient, a thirty-five-year-old woman, had total blindness, optic atrophy, changes in the sella turcica, mental difficulties, entire loss of sense of smell, and facial paralysis of the central type. A frontal lobe tumor was diagnosed, but was to be differentiated especially from sellar and suprasellar neoplasms. An encapsulated subdural tumor was found at operation in the frontal lobe region. At autopsy the third ventricle was found to be sufficiently enlarged to have caused pressure on the optic chiasm. *H. Rommel Hildreth.*

Scardapane, F. **Traumatic papillitis.** Saggi di Oftalmologia, 1929, v. 5, p. 408.

In a rapid review of the literature on papillitis, the writer found there was a lack of distinction between papillitis of true infectious origin and that resulting from aseptic processes, traumatic corneal and scleral perforations, or neoplastic or tuberculous chronic states of the anterior segment of the eyeball, for the authors all agree that the papillitis arises from the action of the toxins formed in the anterior portion of the bulb and transported to the papilla by the current of the endocular fluids.

In the author's two cases of papillitis following traumatic perforation of the cornea, there existed a moderate increase in cerebrospinal pressure and a moderate increase in albumin on lumbar puncture.

The writer supposes that the increase in intracranial pressure results from the passage of cytotoxins to the optic nerve by way of the lymph currents. Further, there is a slight degree of serous meningitis due to stimulation of the choroidal plexus with increased fluid production by toxins reaching the ventricles through the lymphatics in the optic nerve.

F. M. Crage.

12. VISUAL TRACTS AND CENTERS

Globus, J. H. **Tumors of the quadrigeminate plate.** *Arch. of Ophth.*, 1931, v. 5, March, pp. 418-444.

Owing to their location, lesions in the region of the quadrigeminate plate compress the aqueduct of Sylvius, so as to produce internal hydrocephalus. The symptoms which develop compose a syndrome which is divided under three general subheadings: (1) The general signs resulting from increase in intracranial tension, which include papilledema, headache, vomiting, and dulling of the intellect. (2) Local signs, the result of direct anatomic changes in the quadrigeminate plate and the surrounding structures. These lesions produce disturbances of the extrinsic and intrinsic ocular muscles, ophthalmoplegias, Argyll Robertson pupils, paralysis of upward gaze, skew deviation, diplopia, pyramidal tract and cerebellar signs, and other manifestations of midbrain disease, such as tremor, postures, and rigidities. (3) The indirect signs resulting from disturbances of distant portions of the brain, which may be noted as vegetative dysfunctions, that is polydipsia, polyuria, and changes in skeletal development or of secondary sex characters.

At autopsy, due to an expanding lesion posterior to the third ventricle, there will frequently be found thinning of the tuber cinereum, distension of the third ventricle, and later of the lateral ventricles. A tumor in this region, as

a rule, is the result of a pineal rest, and is therefore given the name pinealoma. In the course of its development, it recapitulates various phases of the developing pineal body, and even the advanced histogenetic stage of the mature pineal body. Seven cases are reported from a clinical and pathological standpoint. The author feels that clinical methods of examination yield information sufficient to diagnose these tumors and their location, without resort to mechanical aids.

An attempt is made to explain some of the commoner symptoms observed. The Argyll Robertson pupil is due to pressure upon the third nerve by the expanding aqueduct. The cause of paralysis of upward gaze has not definitely been determined, but it is probable that a supranuclear coordinating center, situated somewhere in the periaqueductal region, is disturbed by indirect effect of the tumors upon this region. It probably does not lie in the corpora quadrigemina themselves, as this lesion has been observed in a number of cases of cerebellar tumor, where these bodies are not involved. The author feels that skew deviation is due to some disturbance of the nucleus of Deiter. That nystagmus is not present would appear to exclude the contents of the posterior fossa. Vegetative dysfunctions are almost certainly the result of the aqueduct. It has been thought of intracranial pressure due to closure that sexual precocity was associated with the pineal body, but from absence of it in all but one of the seven cases reported by the author, he is led to believe that this is not so. Cerebellar dysfunction may be simulated by injury to the anterior cerebellar peduncles, and it is through such injury that tumors of the quadrigeminate plate result in these clinical manifestations.

M. H. Post.

Hambresin. **Typical bitemporal hemianopsia which disappeared completely after the use of x-rays.** *Bull. Soc. Belge d'Opht.*, 1930, no. 61, p. 74.

The patient showed well-marked bitemporal hemianopsia without radio-

graphic signs. After the third treatment improvement began in the right eye, with isolated patches of returning vision in the lower temporal field. Twenty days later these patches were united and the lower temporal field of the left eye was partly regained. Two months later the fields had returned to their normal limits and central vision was normal. There were in all sixteen irradiations in less than six weeks. The diagnosis offered by the author was tumor of the hypophysis, probably a suprasellar adenoma. The results of the treatment were remarkable and almost unique in the complete restoration of vision and fields.

In three other cases of tumor of the hypophysis, x-ray was not effective. The author advises beginning with the x-ray; but the result should be rather prompt, the effect being manifest after several treatments. If no results follow by the end of the month, one should stop x-ray.

Bearing in mind that the x-ray may induce congestive phenomena with compression of the chiasm, that one may have to recommence treatment after some months, and that the tumor cells become more and more refractory to radiation, one arrives at the conclusion that radiotherapy does not yet seem to be the treatment of choice for hypophyseal tumors. *J. B. Thomas.*

Marquez, M. **The reason for the existence of the optic chiasm.** *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, Jan., p. 14.

Cajal, in his classical study of the structure of the optic chiasm and the general theory of decussations of nerves, traces the evolution from panoramic vision of animals with total decussation to the semidecussation in man in whom the crossed bundle is still larger than the direct one and the relic of panoramic vision remains in the form of temporal crescents, but Cajal, however, stops short at the hypothesis of equality of the two bundles with complete fusion of the two monocular fields into a single binocular field of vision. For a better understanding of the genesis of the semidecussation, Marquez

would start with the hypothesis of the cyclopean eye in which there is no decussation at all, pass to the anatomically symmetrical splitting of the single eye into the functionally hemioptic nerves, as Grasset calls the optic nerves in the higher vertebrates, and end with the total decussation in the lower vertebrates. The existence of the chiasm with semidecussation is thus seen not to be directly linked to vision with lenticular eyes, but serves principally the need for appreciation of distance and depth perception. The need for retinal correspondence, which the theory of the "local sign" would appear to make not absolutely indispensable, is linked to existence of sensory-motor reflexes, as already pointed out by Wundt. A series of diagrams illustrate the article.

M. Davidson.

Rollet, J. **Cortical syphilitic blindness.** *Bull. Soc. d'Ophth. de Lyon*, 1930, v. 18, p. 13.

Published observations are estimated to number about 200. The case reported by Rollet was notable in that it was rapidly improved by treatment.

The symptom triad of cortical blindness was present, i.e., blindness, conservation of photomotor reflexes, and normal fundus oculi. The author suggests that "cerebral blindness" would be preferable to "cortical" in these cases, in view of the impossibility of precise localization of the lesion. In the present case the vision returned in the form of a homonymous hemianopsia, which seemed to justify the hypothesis that double hemianopsia had existed.

J. B. Thomas.

13. EYEBALL AND ORBIT

Abassi, A. F. **Tuberculosis of the eyeball and its adnexa.** Fourth annual report Giza Memorial ophthalmic laboratory, 1929, pp. 46-53.

Ocular tuberculosis appears to be rare in Egypt, although the mortality from general tuberculosis is higher than in either Europe or America. Only twenty-one cases have been recorded in the past seventeen years by the patholo-

gists to the government ophthalmic hospitals. These were equally divided as regards geographical distribution, ten cases being reported from Upper Egypt and eleven from Lower Egypt. In none of the cases did the surgeon notice tuberculosis in other parts of the body. The disease was distributed as follows: conjunctiva, seven cases; iris and ciliary body, four cases; choroid, three cases; eyelid, two cases; lacrimal gland, three cases; lacrimal sac, one case; and orbit, one case. It would appear that females are more susceptible than males, as fourteen of the twenty-one patients were females. Ten of the twenty-one were less than ten years of age. The pathological appearance of the ocular lesions was typically tuberculous and did not differ markedly from the other tuberculous foci seen elsewhere in the body. Caseation was not a constant feature, only seven of the cases showing definite evidence of this. In none of the sections could tubercle bacilli be demonstrated in situ. *Phillips Thygeson.*

Arjona, J. **A new case of Crouzon's disease.** *Arch. de Oft. Hisp.-Amer.*, 1930, v. 30, Dec., p. 650.

Crouzon's disease is a nosological entity, although the Germans consider it a variety of oxycephaly. It is distinguished from the latter by marked trigonocephalic type of cranium and very marked exophthalmos, by a basal kyphosis in the roentgenographic profile, rather than lordosis as in oxycephaly, and by an almost ninety-degree facial angle. That Crouzon's disease is not an exclusively hereditary or teratological anomaly, as Crouzon thought, but involves also a pathological acquisition, is indicated by most of the published cases and is corroborated by the author's case. The child, a girl of nine years, had suffered an attack of meningitis with convulsions when seven months old. Headaches followed, and one year later the parents noted increasing bulging of the eyes and of the cranial vault. The eye findings at examination were: enormous bilateral exophthalmos with three-fourths of the eyes anterior to the lower orbital margin,

divergent strabismus of thirty degrees, sluggish pupillary reactions on the left side, and bilateral optic atrophy more marked on the left side. The head was brachycephalic and steeple-shaped, with a marked central osseous bulge trigonocephalic in type. X-ray of the skull showed very thin bones; absence of diploë; marked digitations; absence of the sagittal and metopic sutures and clearly outlined coronary and temporo-parietal sutures; ethmoidal plane inclined downward and backward (which explains the marked exophthalmos); sella turcica slightly enlarged; sphenoid depressed and cerebellar fossa markedly so, giving to the base the kyphosis characteristic of the condition; and small paranasal sinuses and orbital cavities. The Wassermann was negative and the nervous system normal.

M. Davidson.

Charlin, Carlos. **The syndrome of the nasal nerve.** *Ann. d'Ocul.*, 1931, v. 168, Feb., pp. 86-102.

The nasal nerve syndrome is characterized chiefly by crises of intense ocular pain. The regions supplied by this nerve are hyperesthetic. The pathology is located in the anterior segment of the eye, with an associated inflammation in the anterior nasal mucosa of the same side. Because of the ocular symptoms and changes the nasal condition is masked, which makes the diagnosis difficult. In four out of five cases a cutaneous trigger zone or an area of skin eruption was shown. Ordinary methods of ocular therapy fail to bring about a cure. Application of five percent cocaine with adrenalin to the anterior part of the nose affords immediate relief from the pain, a pathognomonic sign. This also acts as the best form of treatment and brings about prompt cure of the eye condition. The distribution of the nasal nerve is reviewed.

Five cases are reported, corneal ulcer, iritis, epithelial keratitis with iritis, simple epithelial keratitis, and corneal ulcer with hypopyon, all of which showed a definite anterior rhinitis on the same side. They responded promptly to the treatment.

For explanation the author suggests the possibility of strangulation of the nerve by the nasal mucosa.

H. Rommel Hildreth.

Ismet, Niyazi. **Serous cyst of the orbit developing in the sheath of the left external rectus.** *Türk Oft. Gaz.*, 1930, v. 1, Oct., p. 549.

The physical findings in the case reported were marked exophthalmos (1 cm.), lowered vision, marked limitation of ocular rotations and total absence of outward movement, and a cystic mass between the globe and the lower external orbital margin. The Wassermann, Weinberg, and Gazoni actions and blood count were negative. Exploratory aspiration yielded a transparent serous fluid negative for echinococcus. The cyst was extirpated by the transpalpebral route; minute search revealed complete absence of the externus muscle. Pathological examination showed the mass to be a serous cyst developed in the sheath and at the expense of the muscle itself.

After extirpation all symptoms were relieved, except that outward rotation was absent and convergent squint remained.

George H. Stine.

Rifat, A. **A case of anophthalmia of one eye with microphthalmia of the other in an infant with congenital syphilis of the second generation.** *Ann. d'Ocul.*, 1931, v. 168, Feb., pp. 141-144.

This syphilitic infant showed anophthalmia on the right side and microphthalmia on the left, internal hydrocephalus, tumor of the testicles, and bone changes. The mother showed clinical evidence of congenital syphilis.

H. Rommel Hildreth.

Vancea, P. **Spontaneous hematoma of the orbit (endothelitis hemorrhagica orbitalis).** *Klin. M. f. Augenh.*, 1931, v. 86, Feb., p. 209.

A woman, aged twenty-nine years, who had weaned her baby four days previously, noticed suddenly during the night that she could not open her right eye. There was exophthalmos, protrusion

of the upper lid, and edema and ecchymosis of the lower lid, the ocular movements being limited in all directions. These symptoms disappeared on the same day and vision rose from 5/15 to 5/5. A more severe attack occurred the second night afterward, and disappeared after twenty-four hours. The affection was attributed to thrombocytopenia produced by absorption of milk colloids, especially casein, after interruption of nursing, and local changes of the vascular endothelium (congenital orbital endothelitis).

C. Zimmermann.

Wheeler, J. M. **Exophthalmos associated with diabetes insipidus and large defects in the bones of the skull.** *Arch. of Ophth.*, 1931, v. 5, Feb., pp. 161-174.

An Italian boy, four years of age, showed exophthalmos of 24 mm. right and 23 mm. left, which increased in one year to 35 on the right and 33 on the left. This was accompanied by rarefaction of the bones of the skull, marked polyuria and thirst. At operation a mass was removed from the right orbit, including part of the optic nerve. It was distinctly yellow and rubbery to feel. The shape and size of the orbital cavity was normal and the periosteum seemed intact. The eyeball appeared crowded forward by the newly formed expanding masses. The cells composing this tumor were identical with those of so-called chordoma, that is, they were large cells of variable shape, with sharply defined limiting membrane, a clear or finely foamy cytoplasm, and a small, rather richly chromatic nucleus. At the same time they resembled fat or xanthoma cells. Staining with Sudan III showed the fat to be confined to the intercellular structure. A second observer, however, noted large xanthoma cells containing lipid. It should be noted that a similar difference of opinion has arisen in another case of this type.

The literature of the subject is reviewed, with especial emphasis on the reports of Schüller and Christian whose name the syndrome bears, as also on the extensive study of Rowland. Was-

sermann and tuberculin tests have all been negative. The blood picture is negative. The impression is of a neoplastic growth involving the floor of the third ventricle, the hypophysis, the orbit, and the bones of the skull. The tissue is most likely to be the yellow, nodular lipoid storage xanthoma of Rowland's description. The diabetes is probably due to involvement of the cerebral tissue in the floor of the third ventricle. The loss of bone is the result of invasion by the hyperplastic process. The exophthalmos is the result of invasion of the orbit by the tumor masses. When the hypophysis is injured, asexuality, dwarfism, and other defects may result.

M. H. Post.

14. EYELIDS AND LACRIMAL APPARATUS

Cange, A., and Duboucher, H. **Cysts and fistulas of the lacrimal gland.** Arch. d'Opht., 1931, v. 48, March, p. 161.

A case of trachoma is reported in a man who had had a canthoplasty done at the age of seventeen years. Following this he had developed a lacrimal fistula in the scar on the left side, which had persisted for twenty-four years. The external opening of the fistula was transplanted into the upper retrotarsal fold with complete cure. Attention is called to the fact that at times excretory ducts of the lacrimal gland enter the inferior cul-de-sac by crossing the lateral commissure. In such cases canthotomy may wound these ducts and a fistula may result. The above case is explained on such a basis. The literature upon lacrimal cysts and fistulas is reviewed and discussed.

M. F. Weymann.

Charamis, J. S. **Concerning two cases of congenital anomaly of the lacrimal passages.** Arch. d'Opht., 1931, v. 48, March, p. 216.

A woman aged forty years was found to have two puncta on each lower lid, one in the normal position, and a smaller accessory one lateral to it. The canaliculus of the accessory punctum opened into that of the normal punctum. In the second case, that

of a two-year-old infant, a punctum was found on the skin 2.5 mm. to the nasal side of the canthus. This was the opening of a 1.5-mm. canal ending in a cul-de-sac. These anomalies are explained by supernumerary sprouts of the original two branches of the cords of cells which form the canaliculi. A discussion of the literature upon the subject is given. *M. F. Weymann.*

Cuénod and Nataf, Roger. **Attention to the angles in the operative correction of trichiasis.** Rev. Internat. du Trachôme, 1931, v. 8, Jan., pp. 19-23.

The authors call attention to the frequent recurrence of trichiasis when operated upon by the usual procedures. These recurrences take place nearly always at one or the other of the extremities of the lid margin. The procedure which Cuénod and Nataf recommend and which they have used in more than 25,000 cases consists of a combined tarso-conjunctival excision to which is added a hemicanthoplasty.

The operation is done in five stages as follows: (1) Marginal incision, regular and more or less deep according to the correction required, going from one extremity of the lid to the other. (2) Incision parallel to the preceding, two millimeters above the normal ciliary border. (3) Partial tarsectomy including the conjunctiva and excision of a musculo-cutaneous strip. (4) Passing three sutures through the marginal incision and inserting into the tendon of the elevator muscle of the lid. (5) Correction of the angles by the excision of a small musculo-cutaneous triangle lying between the marginal and supra-marginal incisions.

A mild overcorrection is not undesirable and this gives added guaranty against recurrence. If the immediate correction appears insufficient the marginal incision can be deepened, taking care to avoid cutting the already-placed sutures. The authors state that owing to this technique their recurrences have been rare.

Phillips Thygeson.

Goldfeder, A. E. **Marginoplasty with auricular cartilage without skin in par-**

tial trichiasis. Klin. M. f. Augenh., 1931, v. 86, Feb., p. 218.

The method consists in an intermarginal incision about 2 mm. deep with a lance-shaped knife, close behind the row of trichiatic lashes, about 2 mm. longer than the row, and a small incision at each end at right angles in the outer edge of the upper and the inner edge of the lower lid to produce better gaping of the incision. A skin-free piece of cartilage 1.5 mm. wide is cut from the upper margin of the helix, trimmed with straight scissors, and tucked into the intermarginal pocket. The results were good in all cases, so that the method is warmly recommended.

C. Zimmermann.

Klauber. Treatment of paralytic lagophthalmos. Klin. M. f. Augenh., 1931, v. 86, Jan., p. 80.

In a woman aged sixty years, with lagophthalmos from total left-sided paralysis of the facial nerve, existing for three years after an ear disease, and with paralytic ectropion of the lower lid, the lagophthalmos was operated on according to Kuhnt-Szymanowski and the excised triangular piece of the thickened tarsus implanted under the skin of the upper lid, undermined from the incision at the temporal angle, followed by a moderate external tarsorrhaphy. Thus the weight of the upper lid was increased, so that the left palpebral fissure was as wide as the normal right and in voluntary closure only a space 2 mm. wide remained open, the cornea being fully covered. In another case, that of a man aged fifty-seven years, the excised piece of normal tarsus of the lower lid was implanted into the upper lid but was not sufficiently heavy. The condition was improved by injection of 0.5 c. c. of seventy-five percent alcohol into the levator.

C. Zimmermann.

Pochisoff, N. A new marginoplastic operation for trichiasis. Klin. M. f. Augenh., 1931, v. 86, Feb., p. 213.

Through an intermarginal incision the skin with the lashes is separated from the tarsus. Two millimeters above

the roots of the lashes an oblique cut from the wound surface of the skin detaches the part bearing the lashes so far that it can be turned 180° downward and laid on the tarsus, where it is sewed in place. Thus the lashes are turned forward instead of backward as before. Thirty patients were successfully operated upon in this fashion.

C. Zimmermann.

Rubio, J. F. The abortive treatment of furuncles and styes with the galvanocautery. Arch. de Oft. Hisp.-Amer., 1930, v. 30, Nov., p. 623.

Hordeolum internum may, as is well known, lead to serious complications, such as orbital cellulitis, thrombophlebitis, meningitis, and staphylococemia; and it may prove fatal. Having found the galvanocautery useful in the abortion of furuncles, the author tried it in the abortion of hordeolia, with brilliant results. It is effective only in the first thirty-six hours. A very sharp tip is used, and in hordeolum internum the infected meibomian gland is penetrated.

M. Davidson.

Sie-Boen-Lian. A simple entropion operation. Klin. M. f. Augenh., 1931, v. 86, Feb., p. 225.

This is a modification of Panas's operation and can be done in about six or eight minutes. An incision 2.5 mm. from the lid border and parallel to it is made through conjunctiva and tarsus and the tarsus dissected from the skin. Three doubly armed sutures are carried through the conjunctiva, the needles coming out just above the row of lashes, where the sutures are tied and fixated above the brow with adhesive plaster. The cosmetic effect is good, as a scar of the skin is avoided. Sixty patients were operated on with good results.

C. Zimmermann.

Terson, A. Lacrimal ectropion very marked, treated by submucous injections of double chlorhydrate of quinine and five percent urea. Ann. d'Ocul., 1931, v. 168, Feb., pp. 138-141.

This case had marked ectropion of the lower lids of several years' duration.

The condition was corrected by injections beneath the conjunctiva. No scar followed.
H. Rommel Hildreth.

Thies, Oscar. **Actinomycosis of the visual organ.** *Klin. M. f. Augenh.*, 1931, v. 86, Jan., p. 55.

A woman aged twenty-eight years had been suffering over a year from right purulent dacryocystitis. The tear sac was extirpated, but as the suppuration continued the patient consulted the author. The region of the lower canaliculus showed redness and protrusion which persisted after pus was pressed out. After slitting the canaliculus a white crumbling mass was evacuated which under the microscope proved to be actinomycetes.

The cornea of the second patient presented a grey protuberance similar to a keratocele, which healed under intense heat radiation, but relapsed after three months, when the opacity showed several intensely white nodules which consisted of actinomycetes. Thorough curetting cured the condition.

C. Zimmermann.

Yagues Garcia. **Treatment of congenital dacryocystitis.** *Arch. de Oft. Hisp.-Amer.*, 1930, v. 30, Dec., p. 641.

Massage, or downward pressure on the lacrimal sac, has been found sufficient, and probing is only to be resorted to when the former fails. Three cases are cited in illustration.

M. Davidson.

15. TUMORS

Ellis, Z. H., and McKeown, H. S. **Osseous tumors of the orbit.** *Arch. of Ophth.*, 1931, v. 5, March, pp. 449-460.

Two cases of bony growth of the orbit, resulting in exophthalmos and other ocular disturbances, are reported in this paper. Most bony new growths involving the skull and facial bones have been classified as Paget's disease. Virchow, however, gave the term leontiasis ossium to those cases in which this new bone formation was limited to the bones of the skull. The new bone is at first soft, but gradually acquires an

ivory hardness. The bones of the skull may become as much as 5 cm. thick between the inner and outer tables. The bone marrow is converted into a vascular fibrous tissue. The usual architecture of bone is disorganized and the cortex loses its usual character. Marble-hard exostoses of lobulated appearance are present. The spaces between the skull and the accessory nasal sinuses gradually become obliterated and the fissures and foramina become narrower and narrower. As a result, headaches, cramps, paralyses, neuralgia, blindness, and distortion of the sense of smell occur. The feet and hands may rarely hypertrophy. Paget's disease usually occurs in older persons. The bones become softer and more brittle, while the deforming thickenings involve many parts of the skeleton, but are most marked in the tibia and the skull, and result in changes in height, posture, and gait. The etiology is undetermined. Apparently there is retention of calcium, magnesium, and phosphorus, with excessive output of sulphur. A similar disease of the bones is one that results in hard, osseous tumors which grow between the tables of the skull, or even in the cavities of the sinuses, and may project into the interior of the skull, usually located about the frontal bone. The simpler tumors growing outward may be removed to advantage, though often with great difficulty.

Of the two cases presented, the first is tentatively diagnosed as Paget's disease, and the second as leontiasis ossium. The paper was presented as a preliminary report. In discussion, some disagreement as to the diagnosis in individual cases was noted. It was suggested that the growths appeared to be true bony tumors of the orbit.

M. H. Post.

Gabriélidès, C. **Orbito-temporo-palpebral fibroneuroma.** *Ann. d'Ocul.*, 1931, v. 168, March, pp. 187-206.

The patient, aged fourteen years, showed a fibroneuroma of the upper lid and orbit, cranial bone changes including the sella turcica, pigmentary disturbances, and inferior mental develop-

ment. The tumor had gradually enlarged since birth. There was no history of this disease in the family. Three weeks following removal of the lid tumor it had regrown to its preoperative size.

Occasionally only one of the four findings (cutaneous tumors, fibronuromata, pigmentary changes, and intellectual underdevelopment) is seen, other signs appearing later. The nerve tumor is best termed fibroneuroma for the principal element is fibrous tissue. Fibroneuromata are most often located about the palpebral region, are fairly evenly divided between the sexes, and frequently have a hereditary tendency. Invasion of neighboring parts is common, with bone deformity and ocular complications. The etiology is obscure. The treatment is surgical, but is difficult, and deaths from hemorrhage are not rare. Radium, x-ray, and medical treatment have been of little value.

H. Rommel Hildreth.

✓ Gifford, S. R. **Multiple myxoma of the orbit.** *Arch. of Ophth.*, 1931, v. 5, March, pp. 445-448.

In 1926 the author reported a case of multiple myxoma of the orbit in a woman of twenty-five years. There were ptosis and swelling under the right lid, which prevented upward movement of that eye. Incision was made through the brow and a group of shiny grayish bodies were removed, apparently not connected with one another. Four years later, the patient reported with recurrence. A like operation was performed, and about ten bodies were removed, the largest of which resembled a white grubworm one inch long. Sections showed these nodules to be composed of a loose tissue of characteristic spindle-shaped cells, having long processes, the spaces between the fibrils containing an almost homogeneous material. Some of the fibrils stained pink with eosin, while more of them took a similar color from Van Gieson's stain. There was no capsule. Thionin stain for mucin showed a homogeneous blue color. These growths are very rare.

M. H. Post.

Gomez-Marquez. **An interesting case of deep tumor of the orbit.** *Arch. de Oft. Hisp.-Amer.*, 1931, v. 31, Jan., p. 32.

The case reported, that of a small, round-cell sarcoma found at the apex of the orbit, presented the unusual feature of slow development and freedom from visual and motor disturbances. The patient, a woman of thirty-two years of age, was observed for two years before removal of the tumor. The protrusion was straight forward except toward the last when a lateral displacement manifested itself. The author uses a dental circular saw for making the osteotomy, and suggests that, in making the quadrilateral flap of the soft parts, the horizontal incisions be made to cross over into the anterior lip of the vertical incision (made with concavity forward) in order to facilitate coaptation in suturing. Illustrations include operative procedure and microphotographs. *M. Davidson.*

Hemmes, G. D. **Investigations on the occurrence of glioma of the retina in relatives of glioma patients.** *Klin. M. f. Augenh.*, 1931, v. 86, March, p. 331.

Hemmes collected data from families of forty-eight glioma patients, with the following results: The frequency of glioma of the retina in the Netherlands may be estimated as one out of 34,000 of those born living. As a rule glioma of the retina is isolated and occurs only exceptionally in blood relations. If glioma is isolated it is not permitted to dissuade the patient from a future marriage. Glioma of the retina is more frequent in first born than later born children.

C. Zimmermann.

✓ Lazarescu, D., and Lazarescu, E. **Plexiform neuroma of the lid and orbit and Recklinghausen's disease.** *Ann. d'Ocul.*, 1931, v. 168, March, pp. 166-187.

A detailed report is given of a two-year-old infant with Recklinghausen's disease showing pigmentary disturbances and multiple neurofibromata. Of special importance was the nerve-tumor involvement of the upper lid and

orbit which had invaded the conjunctiva and lacrimal gland. Osseous changes were also shown. The child's mother, aged twenty-three years, presented the typical triad of pigmentary changes, skin tumors, and neurofibromata.

H. Rommel Hildreth.

Ling, W. P. **Ocular neoplasms among the Chinese.** *Nat. Med. Jour. China*, 1931, v. 17, Feb., p. 18.

The author reviews eighty-two cases of ocular neoplasm occurring among the Chinese and observed during nine consecutive years. The cases are divided into three groups, according to their primary locations. Group one consists of sixteen intraocular tumors, fifteen of which were gliomata, and one melanosa of choroid. Group two consists of twenty-two intraorbital tumors, nineteen of which were primary and three secondary. Group three consists of forty-four extraorbital tumors, the majority of which were carcinoma and epithelioma.

The clinical history, findings, and pathological reports of all of the cases in group one are given, together with a lengthy discussion of glioma and melanosa of the choroid. Groups two and three will appear in later issues.

M. E. Marcove.

Mita, H. **Two cases of foreign body tumor of the lids after operation for acute mastoiditis.** *Klin. M. f. Augenh.*, 1931, v. 86, Jan., p. 59.

Two children, aged seven and eight years, were operated on for acute mastoiditis and granugenol-Knoll was introduced into the wound. Soon the left side of the face was swollen and after two weeks the lids presented tumors, so that the eyes could not be opened. Excised portions consisted of proliferated endothelial cells, tough connective tissue, alveoli, and foreign body giant cells. The author saw the cause in certain oily substances which were perhaps transported from the place of operation through the perivascular lymph spaces and remained in the surroundings of the finest vessels, producing pro-

liferation of the endothelium of the vascular walls with simultaneous occurrence of numerous giant cells. The tumor masses could not be entirely removed, so that the disfigurement was still considerable, although the palpebral fissures had become somewhat wider.

C. Zimmermann.

Morax, M., and Vialeix, V. **Ocular metastasis of an unsuspected visceral tumor.** *Ann. d'Ocul.*, 1931, v. 168, March, pp. 161-165.

A female sixty-one years of age had been totally blind in one eye for the last three months. The tension was slightly elevated but there was little pain. Ophthalmoscopically a grayish-white tumor filled the posterior two-thirds of the vitreous. Fifteen days after enucleation the patient developed hemiplegia and died soon after in coma. Before the ocular condition there had been no general complaints of note. The ocular tumor was epithelial in nature suggesting an origin in the ovary or Wolffian body. No autopsy was done.

H. Rommel Hildreth.

Reese, A. B. **Extension of glioma (retinoblastoma) into the optic nerve.** *Arch. of Ophth.*, 1931, v. 5, Feb., pp. 269-271.

In 52 percent of 119 cases operated on for glioma, the optic nerve was found invaded posterior to the lamina. In 81 percent of these cases, the tumor had not been completely removed at operation. The size of the intraocular tumor bore no relation to the amount of extension of the optic nerve. Extraocular extension was rare, but the nerve tissue appeared especially liable to invasion. Death results from direct invasion of the brain, not from metastases. The fellow eye is, as a rule, invaded by direct extension along the optic nerve. It is now a routine procedure to examine such eyes and the attached nerve trunk within forty-eight hours after operation, so that in case further tumor tissue remains the surgeon may excise more of the nerve trunk, or start radiation.

M. H. Post.

Spencer, F. R. **Primary cholesteatoma of the sinuses and orbit.** Arch. of Otolaryngology, 1930, v. 12, July, p. 44.

Spencer reports the case of a man who was first seen at the age of forty years, complaining of exophthalmos of one eye of twenty years duration. The vision in this eye was 2.5 percent, optic atrophy being present. Operation was refused, but the patient returned three years later complaining of more exophthalmos, poorer vision, and more pain. An exploratory operation on the orbit revealed a milky fluid with a foul odor. A cholesteatoma 7 by 5 cm. was removed from the right orbit and the right frontal sinuses. Permission to remove all the tumor radically was denied and the condition continued to progress. Fourteen years after first being seen the patient was again operated upon; tissue removed was diagnosed as squamous-cell carcinoma. The patient died two months later. We thus have a case of thirty-four years duration leading to carcinoma and death.

A review of the literature and a bibliography are given.

Ralph W. Danielson.

Thies, Oscar. **Sarcoma of the supramaxillary antrum, with perforation into the right eyeball, in a child aged nine months.** Klin. M. f. Augenh., 1931, v. 86, March, p. 345.

The lids of the right eye had been very much inflamed and swollen for a few days. The eyeball showed no irritation and appeared normal. Puncture of the right supramaxillary sinus released thickened dirty-looking pus. The antrum was opened and a sarcoma was found. After its removal the eye sank downward, the osseous floor of the orbit being extensively destroyed, but no changes were found on the eyeball. A week later the anterior chamber suddenly showed a large exudation which prevented an intraocular view. This gradually subsided, and after three weeks a melanosisarcoma of the choroid was seen and the eye was enucleated.

C. Zimmermann.

Zentmayer, William. **Primary sarcoma of the iris.** Arch. of Ophth., 1931, v. 5, Feb., pp. 219-223.

A leucosarcoma resting on the inner circle of the iris, to which it was attached by fleshy-looking strands, was removed along with neighboring portions of the iris from the eye of a boy ten years of age. The local lesion was then treated five times with low voltage x-ray exposures, receiving in all 175 percent of an erythema dose. High voltage treatments were given at the same time over the temporal zygomatic regions and the left cervical region. Eight such treatments were given, amounting in all to 215 percent of an erythema dose. There was no loss of eyelashes, nor any damage to the skin. Pathological examination showed elongated spindle-shaped cells with ovoid nuclei, and large blood vessels with walls composed of endothelium only. Many of the cells were swollen or shrunken, and some greatly deformed. Four years later, the patient was in good health, and with proper correction vision was 6/20.

The author feels that since iridectomy alone in suitable cases has yielded very good results, it is justifiable to continue this practice, especially in view of the additional safety provided through the use of x-ray and radium therapy.

M. H. Post.

16. INJURIES

Bab, Werner. **Traumatic keratoconjunctivitis from cignolin.** Klin. M. f. Augenh., 1931, v. 86, Jan., p. 82.

Mistaking it for yellow mercurial ointment, a man aged twenty-four years put a ten percent cignolin salve into his eyes. This caused violent conjunctivitis with erosions of the cornea. The irritation lasted four weeks, but vision was fully recovered. Cignolin is a synthetic substitute for chrysarobin, and causes the same symptoms as that drug.

C. Zimmermann.

Colley, Thomas. **Foreign bodies in the upper conjunctival fornix.** Brit. Med. Jour., 1930, v. 2, Oct. 11, p. 600.

Colley says that foreign bodies in the upper cul-de-sac are often undetected for a considerable period, because they do not strike the sensitive cornea; the patients frequently do not seek aid until a local reaction has been established.

Foreign bodies in this position produce a clinical picture which is fairly typical. Pain is usually absent, and the discharge, at first watery, quickly becomes mucopurulent. The upper lid becomes edematous and the superior palpebral fold puffy. The lashes are stuck together by the discharge, but when the lids are separated the conjunctiva appears fairly healthy. The upper fornix, however, is the site of an intense reaction, the intensity being dependent on the length of time during which the foreign body has been retained. In some cases ulceration may take place, and the foreign body may be found embedded in granulation tissue. It is also feasible to think that such foreign substances as straw, which are relatively sharp, and which at first lie horizontally along the fornix, may later cause ulceration, and the action of the lids may actually drive them into the tissues of the orbit.

Two such cases are reported in which imbedded foreign bodies were found only after scraping away tissue in the region of the greatest reaction.

Ralph W. Danielson.

Pallarés, J. **A case of double hemianopsia with conservation of macular vision following birth injury.** *Ann. d'Ocul.*, 1931, v. 168, Jan., pp. 45-47.

The case is reported because of its unusual etiology. The patient was first seen at the age of sixteen years, the complaints suggesting gross field defects. The history definitely established etiology as birth injury. Examination showed vision of 8/10 and 2/10, fields narrowed to less than five degrees, hemiparesis, and posterior skull depressions.

Under strychnine and galvanization of the optic nerve the vision was improved to 10/10 and 4/10 and the fields were approximately doubled in area.

H. Rommel Hildreth.

Roggenkämper. **Transitory myopia after injury by steel foundry ashes.** *Klin. M. f. Augenh.*, 1931, v. 86, Feb., p. 239.

Ashes from a steel foundry furnace flew into the eyes of a laborer aged twenty-seven years. The corneæ showed erosions and the whole uvea and optic nerve showed inflammatory changes. Vision was reduced to 5/50, with -5.00 sph. -0.75 cyl. ax. 180° = 5/5, under atropin cycloplegia. The myopia subsided entirely within seven weeks. The ashes of steel furnaces contain arsenic and in analogy to the transitory myopia observed after injections of salvarsan and attributed to irritation of the ciliary muscle, the author assumed local poisoning by arsenic, favored by a local hypersensitiveness to this metal.

C. Zimmermann.

17. SYSTEMIC DISEASES AND PARASITES

Bailliant, P. **The eye in cases of hypertension.** *Bull. de la Société Belge d'Opht.*, 1930, no. 61, p. 18.

A generation ago it was believed that glaucoma was due to high blood pressure. Even today a certain tendency persists to treat ocular hypertension as directly dependent on arterial hypertension. Clinical observation leads us to these conclusions: (1) That high blood pressure patients have most often a normal ocular pressure, sometimes even a slightly lowered tension. (2) That the glaucomatous are not all hypertension cases, and one at times encounters acute glaucoma in patients with low arterial tension. Yet in many cases of chronic glaucoma we do find arterial hypertension.

The author proposes this formula: "In glaucoma the danger is formidable when the ocular tension reaches or exceeds one-half the humeral diastolic pressure." The elevation of the arterial pressure may compensate the ocular hypertony, but only for a while, because the obliteration so often associated with arterial hypertension menaces the retinal vessels, such menace

sometimes being realized suddenly after a rough decompression operation on an eye with sclerosed vessels. The author attributes to this cause certain postoperative contractions of the visual fields.

In examination of hypertension cases in the general medical wards one often discovers early symptoms of retinal disturbance which must not be disregarded, as they often precede by a long time the appearance of retinal lesions: (a) sensation of slight mist; (b) dark points or luminous points; (c) globes of fire appearing suddenly; (d) visual eclipses more or less transient and more or less complete, suggesting a disturbance of the occipital as well as the retinal regions.

One may also encounter more advanced retinal lesions such as: (1) papillary edema of all degrees, giving the impression of papillary stasis; (2) hemorrhages more often central than peripheral; (3) edema and fibrinous exudates; (4) thrombosis of retinal veins, arteritis, and periarteritis; (5) circinate retinitis.

As to the exudates, white or dirty gray in color, and of which the macular star is typical, the color or appearance of elements is more characteristic than their stellate disposition. Their recognition is of prime importance. The author found that in cases with stellate exudate the blood area was rarely normal. He calls this type of retinitis "azotemic."

The author has noted in retinitis the existence of a relative arterial hypertension; the retinal pressure no longer rises equally with the general pressure, but instead of being scarcely one-half of the humeral pressure it approaches the general diastolic pressure.

Abnormal elevation of the retinal pressure in comparison with the general pressure would have a prognostic significance (grave) and diagnostic significance (nephritic origin). It is a sign which may aid us in certain cases to differentiate albuminuric retinitis from purely hypertensive retinal lesions.

We must attribute the elevation of

retinal pressure to one or more of three causes: (1) inflammation, (2) intracranial hypertension, (3) local vascular lesions.

When obliteration occurs in the trunk of the central artery before entering the globe, it induces a retinal arterial hypotension, and the pressure is below the figure it should reach in relation to the humeral pressure. If, on the other hand, it affects the capillary plexus beyond the point examined, it provokes retinal hypertension or increases it if it already exists, by creating a new peripheral resistance, arresting the flow of the blood column toward its normal exit, releasing also it seems a reflex contraction above the point of obliteration.

We should utilize the method of Fritz to evaluate the rigidity of the central artery of the retina and by aid of the dynamometer measure its resistance to obliteration, a resistance greater as the walls are more sclerosed. We have in this a valuable method of measuring the functional state of the cerebral arteries.

J. B. Thomas.

Branbergen, R. T. **Cataract after thyroidectomy.** Arch. d'Ophth., 1931, v. 48, Feb., p. 120. (See Section 9, Crystalline lens.)

Steinbugler, W. F. C., Gillett, H. W., and Dunning, H. S. **Oral infections and their relations to diseases of the eye: a symposium.** Jour. Dental Research, 1930, v. 10, Dec., pp. 685-726.

In presenting the viewpoint of the ophthalmologist, Steinbugler gives opinions of various men. The absence of radiographic evidence of infection at the apex of a pulpless tooth never excludes the presence of active infection. In many cases the radiographically negative tooth is a far greater source of systemic infection than the positive, since in the former there may be little resistance to the infection.

In cases of iridocyclitis, cultures made from the aqueous give excellent results. Reference is made to the lymphocyte described by Toren as specifically indicating dental infection, and

to other blood findings described by Walter.

When a suspected focus has been removed, and rapid and marked lessening of the inflammation does not set in within forty-eight hours, the true cause has not been reached and a further search should be made. Conservatism should be practiced regarding the extraction of teeth, but in doubtful cases elimination of oral sepsis should be given precedence over preservation of the teeth.

Gillett, in presenting the viewpoint of the general practitioner of dentistry, remarks that the lymph and blood circulation of the tooth pulp and periodontal tissues suggests that this is the path by which infection from tooth foci reaches the eye; and that case histories in which mandibular teeth were the source strongly tend to confirm this view.

Dunning, in presenting the viewpoint of the oral surgeon, expresses the belief that nearly all pulpless teeth become infected and that most pulpless teeth should be removed. He does not believe in curetting infected alveoli of teeth after extraction.

Ralph W. Danielson.

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Frenkel, Henri. **Criticisms of certain terms applied in ophthalmology.** Arch. d'Ophth., 1931, v. 48, March, p. 205.

Inflammation of the cornea due to syphilis should be properly termed interstitial keratitis and not parenchymatous keratitis. Phlyctenular keratitis is improperly named, as phlyctenule is not a correct term for accumulations of leukocytes. A more proper designation would be foci of leukocytic infiltration. Certain ophthalmologists refer to phlyctenules of the cornea as abscesses. Abscess of the cornea occurs only in purulent infections such as serpent ulcer or gonorrhea. Descemetitis indicates an inflammation of Descemet's membrane. This is impossible and the term should not be used for the precipitates of cyclitis. Hyperemia of the conjunctiva is too frequently called con-

junctivitis, which latter term designates inflammation with secretion. The terms blepharoconjunctivitis and keratoconjunctivitis are objectionable. For ocular contusion and traumatic choroiditis the terms traumatic syndrome of the anterior and posterior segment, respectively, are suggested. Myopic choroiditis suggests inflammation, thus posterior staphyloma would be a better term. It is urged that terms be chosen more carefully. *M. F. Weymann.*

McCord, C. P. **Occupational nystagmus in train dispatchers.** Jour. Amer. Med. Assoc., 1931, v. 96, April 4, p. 1131. (See Section 4, Ocular movements.)

Marquez and Lauber. **Professor Fuchs!** Arch. de Oft. Hisp.-Amer., 1931, v. 31, Jan., p. 1.

In a warm tribute to the memory of Fuchs, Marquez recalls the great man's mastery of the Spanish language and his love for Spain. An article on sympathetic ophthalmia, which Fuchs wrote for a text book of ophthalmology that Marquez has in preparation, will shortly appear in the Archivos.

Lauber's tribute is an abridged translation of the one published in the Klinische Monatsblätter für Augenheilkunde for December. *M. Davidson.*

Morax, V. **Ernst Fuchs, 1851-1930.** Ann. d'Ocul., 1931, v. 168, Feb., pp. 81-86.

A biography.

H. Rommel Hildreth.

Wilson, R. P., and El-Kirdani, A. L. **Ophthalmic survey of the village of Bahtim.** Fourth annual report Giza Memorial ophthalmic laboratory, 1929, pp. 71-86.

Wilson and El-Kirdani examined 3,058 of the 3,549 inhabitants, mostly of the fellah type, of the village of Bahtim. All inhabitants over the age of one year, with the possible exception of one marasmic child, were found to have trachoma in one stage or another. The following facts were noted: (1) The people become infected in the very

earliest years of life, the greatest majority before the age of one year. (2) Trachoma in stage 2a (florid trachoma) develops very early in life (maximum incidence five to ten years). (3) Few cases would appear to pass directly from stage 1 to 3 and 4. (4) Stage 2b (papillary hypertrophy) is comparatively rare. (5) There is a great and early tendency for the trachomatous process to cure itself by cicatrization. This is especially marked in Egyptian trachoma. (6) The active and most infective stages of trachoma (stages 1 and 2) are not often seen in adult life. (7) Complete spontaneous cure of trachoma, without complications, is not very common, although it is remarkable to note the early age at which this sometimes occurs. (8) Hyaline degen-

eration is fairly frequently seen as a late result of trachoma.

Only nineteen of 139 infants examined were found to have normal conjunctivas, and none was found to be normal after the second month of life. At the time of observation forty percent of the infants were found to be suffering from an acute conjunctivitis. Approximately twenty-five percent of the population having stage 3 trachoma were found to be suffering from trichiasis. Acute gonococcal conjunctivitis is mainly responsible for complete blindness, but trachoma plays the greatest part in reducing the visual acuity. 6.64 percent of the inhabitants were blind in one or both eyes and only seven percent had 6/6 vision.

Phillips Thygeson.

NEWS ITEMS

News items in this issue were received from: Drs. C. A. Clapp, Baltimore, Md.; Gaylord C. Hall, Louisville, Ky.; M. Paul Motto, Cleveland, Ohio; G. Oram Ring, Philadelphia, Pa.; T. H. Shastid, Duluth, Minn.; Wm. F. C. Steinbugler, Brooklyn, N.Y.; F. L. Wicks, Valley City, N.D.; and L. A. Nelson, Dallas, Texas. News items should reach **Dr. Melville Black**, 424 Metropolitan building, Denver, by the twelfth of the month.

Deaths

Dr. George McClellan Burroughs, Danielson, Conn.; aged sixty-eight years, died March first.

Dr. George E. Deely, Brooklyn, N.Y.; aged fifty-nine years, was found murdered June second.

Dr. Charles F. Clark, Columbus, Ohio; aged seventy-five years, died April twenty-second, of heart disease.

Dr. John Walter Park, Harrisburg, Pa.; aged seventy-five years, died January twenty-seventh, of chronic myocarditis.

Dr. Joseph A. Stucky, aged seventy-four, Lexington, Ky., and Dr. Robert C. Lynch, aged fifty-one, of New Orleans, were killed on May 12, in an automobile accident on the Big Hill Road about three miles south of Richmond, Kentucky. According to persons who arrived on the scene a few minutes after the accident, the automobile came down a curving incline to the bottom of the hill where it ran head-on into a bus which had just reached a narrow bridge at its foot, from the opposite direction. A heavy rain was falling at the time. Witnesses exonerated the bus driver. Dr. Stucky's arms and legs were broken and his skull crushed. Dr. Lynch, injured internally, was conscious after reaching the hospital and gave his name and address. They were returning to Lexington to attend a dinner party that had been arranged in honor of Dr. Lynch. As a result of the accident the convention of the eye, ear, nose and throat group of the Kentucky State Medical Association which was to have been held at Bowling Green May 13, and at which Dr. Lynch was to have been the guest of honor and Dr. Stucky to have had a prominent part, was indefinitely postponed.

The Philadelphia correspondent records with profound regret the death of Dr. L. Webster Fox, Professor of Ophthalmology in the Graduate School of the University of Pennsylvania. A long and brilliant career was closed as the final outcome of a serious cardio-renal disease of six months duration. The funeral services were held in Holy Trinity Church, Philadelphia, conducted by the Rev. Floyd Tompkins, D.D.

Miscellaneous

Four universities will offer courses this summer for the training of teachers and supervisors of sight saving classes. They are Tulane, New Orleans, June 15-July 24; University of Chicago, June 22 to July 24; State Teachers College, Buffalo, June 29 to August 7; and Teachers College, Columbia University, July 6 to August 14.

The Governor of Illinois has vetoed a bill to compel the use of Credé's method in the new born. The house passed the bill over the Governor's veto, but the senate failed to do so by six votes. The bill naturally had the support of the medical profession, the Society for the Prevention of Blindness, Helen Keller, and others. The opposition apparently emanated from Christian Scientists.

The first issue of a Bulletin to be known as "Greens' Eye Hospital Bulletin," has just been received from San Francisco. The avowed aim is to make this publication "interesting, instructive and helpful" to the general practitioner and to the ophthalmologist as well. Subscriptions are not invited and no price is named, so we infer that the bulletin will be sent out free.

There was a world conference for the blind in New York April 13. A great many of the visitors were blind. M. C. Migel, president of the American Foundation for the Blind presided. Among the speakers were Donatien Lelievre, Bordeaux, France; Halvdan Kartesrud; William Nelson Cromwell; Senator Thomas P. Gore of Oklahoma; John H. Finley of New York. A recently perfected disk was mentioned which will run continuously for thirty-three minutes and reproduce about twenty-three pages of an ordinary printed book. This machine is said to produce a magnified, raised image of the printed page in the form of dots and lines so close together as to give the impression on the finger of a continuous letter. For certain purposes these disks may eventually replace braille. The guest of honor was Helen Keller.

The program for the Chicago Post-Graduate Course in Ophthalmology, which has been advertised in this Journal for the past two months, has recently been received. The outline is for a most comprehensive course of twelve months beginning September 1. The relative weight of subjects is well chosen and a most admirable group of lecturers has been obtained. If a sufficient number of students can be enrolled to justify the tremendous effort entailed in planning and conducting such a course it should prove a notable achievement in ophthalmology.

Dr. G. Oram Ring and Dr. Charles E. G. Shannon of Philadelphia, gave a dinner of twenty covers at the Union League, on the evening of June 9, in honor of Dr. A. Magitot of Paris. Brief responses were made by Dr. W. H. Wilmer of Johns Hopkins University, Mr. Alba B. Johnson, President of Jefferson Medical College, Justice William I. Schaffer of the Supreme Court of Pennsylvania, and by the guest of honor.

Societies

At a recent meeting of the New York Academy of Medicine, Section of Ophthalmology, Dr. Mark J. Schoenberg was elected chairman, and Dr. Algernon B. Reese secretary for the year 1931-1932.

The Cleveland Ophthalmological Club held its annual election of officers at the April meeting, with the following officers installed for the ensuing year: Dr. R. B. Metz, president; Dr. H. G. Knowlton, vice-president; Dr. P. G. Moore, secretary and treasurer.

The sixty-seventh annual meeting of the American Ophthalmological Society was held at Asheville, North Carolina, June 1, 2, and 3. An unusually interesting program was given. Dr. Edward C. Ellett was elected president and Dr. Thomas B. Holloway, vice-president for the coming year. The next meeting will be held at the Fort Griswold, Groton Long Point, Connecticut.

The thirteenth Annual Session of the North Dakota Academy of Ophthalmology and Oto-laryngology was held in conjunction with the South Dakota section of these specialties in Aberdeen, South Dakota on June second. Papers by the following clinicians were presented:—Dr. Thomas W. Allen, Chicago; Dr. Bert H. Hempstead, Rochester, Minn.; Dr. W. L. Diven, Bismarck, North Dakota; Dr. W. R. Winn, Fargo, North Dakota.

Dr. F. L. Wicks, Valley City, was elected president; Dr. Diven was elected secretary.

The following officers have been elected in the Dallas Academy of Ophthalmology and Otolaryngology. Chairman: Dr. L. M. Sellers, 717 Pacific Avenue, Dallas, Texas. Executive Secretary: Dr. W. M. Knowles, 717 Pacific Avenue, Dallas, Texas. Corresponding Secretary: Dr. L. A. Nelson, 4105 Live Oak Street, Dallas, Texas.

The meetings are held at the Dallas Athletic Club at 6:30 P.M. the first Tuesday of each month from October to June, inclusive.

Personals

Dr. Charles L. Chassignac has resigned as superintendent of the Eye, Ear, Nose and Throat Hospital, New Orleans, after eight years of service.

Dr. Luther C. Peter of Philadelphia was the guest of the Columbus Ophthalmological and Otolaryngological Club on May 4, 1931.

Dr. Edward Jackson, Denver, delivered an address on "General Significance of Visual Tests" at the recent meeting of the Canadian Medical Association at Vancouver, B.C.

Dr. Burton Chance of Philadelphia and the members of his family will leave early in July to spend the summer in Italy and Sicily, returning to this country in October.

Dr. A. B. Bruner, Associate Professor of Ophthalmology at the Western Reserve Medical School, Cleveland, departed the week of May 17, for an extended trip through the "Sunny South."

Dr. Meyer Wiener and Dr. Lawrence T.

Post have been appointed Professors of Clinical Ophthalmology in the School of Medicine, Washington University, effective July 1, 1931.

Professor Magitot, of Paris, gave the following lectures at the Wilmer Institute on May 26, 27, and 28: "Physiological Ocular Tension," "Pathological Ocular Tension," and "Ocular Tonoscopy."

Dr. and Mrs. Howard Forde Hansell of Philadelphia sailed for Europe late in May and will divide their summer between Paris and the Grande Hotel, Vittel. They will return to Philadelphia late in September.

Dr. Raymundo Chaves de Freitas has been appointed chief ophthalmologist, a newly created position in the national department of public health, Brazil. His duties will include the preparation of plans for a national campaign against trachoma.

At the April meeting of the Cleveland Ophthalmological Club, Dr. Jonas S. Friedenwald, associate professor at the Wilmer Institute of the Johns Hopkins University Medical School and Hospital, presented a constructive and interesting paper on "The Blood Vessels in Arteriosclerosis and Hypertension."

At the Sectional Meeting of the American College of Surgeons held in Oakland, California, April 23 to 26, 1931, Dr. Harvey J. Howard of St. Louis gave the following addresses: "The Significance of the Ocular Functions in Aviation Based Upon Our Experience Since the War," "The Offensive and Defensive Mechanism of Acute Conjunctival Infections," and "Trachoma."

Dr. Luther C. Peter of Philadelphia left on the fifteenth of May to be the guest of the Pacific Coast Society at the annual meeting, which was held in Los Angeles on May 28, 29 and 30. Mrs. Peter accompanied him on this trip. The titles of the papers presented by Dr. Peter were "End Results in Monocular Esotropia" and "Dystrophy of the Corneal Endothelium,—Its Recognition and Clinical Significance." The Third Edition of Dr. Peters' volume on Perimetry has just appeared from the press of Lea and Febiger.

Dr. Wm. H. Crisp, of Denver, left May 17 for a trip to England and the Continent, expecting to return about the middle of August. During July he will read a paper before the Oxford Congress, which will be held at Keble College, and at the annual meeting of the British Medical Association at Eastbourne.

Dr. George E. de Schweinitz of Philadelphia was the guest of honor at the annual dinner of the Alpha Omega Alpha Medical honor fraternity, which was held in the Benjamin Franklin Hotel in Philadelphia, on the evening of Thursday, June 11.

Dr. deSchweinitz stressed to the students, the importance of an adequate fundamental medical education, as precedent to specialization and urged coöperation and sympathy between the specialist and the general practitioner.